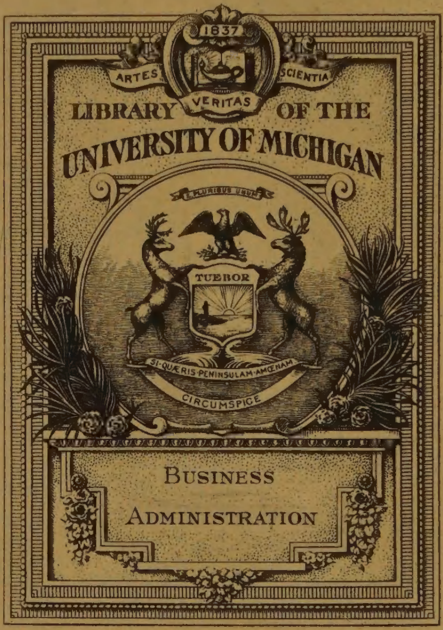
BUS OPERATING PRACTICE

HAUER AND SCRAGG



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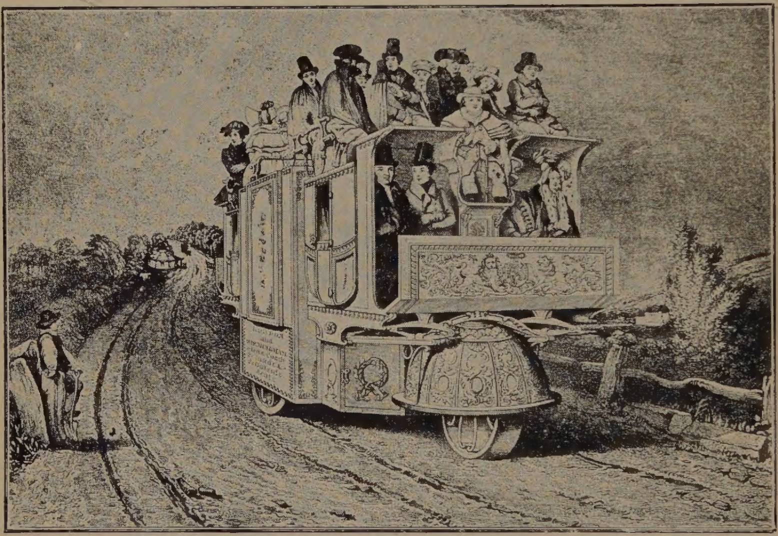

THIS FORERUNNER OF THE MODERN MOTOR BUS WAS BUILT IN 1821 AND ACTUALLY RAN BETWEEN LONDON AND BIRMINGHAM. IT CARRIED TWENTY-EIGHT PASSENGERS ON THE INSIDE AND TWENTY-TWO OUTSIDE. THE FURTHER DEVELOPMENT OF STEAM TRANSIT OF THIS KIND WAS EFFECTIVELY CURBED BY ABSURD STATUTES, ONE OF WHICH REQUIRED THAT A MAN PRECEDE THE VEHICLE, CARRYING A RED FLAG, THUS LIMITING THE SPEED TO FOUR MILES PER HOUR.

BUS OPERATING PRACTICE

BY

ROY HAUER

AND

GEO. H. SCRAGG

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INTRODUCTION

THE automotive industry has surpassed even the most sanguine prophecies of the pioneers at the century's dawn. The evolution of commercial trucking along scientific lines has been particularly marked. Although the inception of the motor bus even antedates other forms of self-propelled vehicles, development of motor bus transit as a genuine utility is of recent occurrence. Expansion has been so rapid that changes in construction, in public attitude and in operating practices have been frequent, rapid and radical. No one therefore had stopped to record the lessons learned, nor could anything intelligible have been gleaned from the swift panorama of change which down to the present writing has marked the growth of the bus industry. The resultant lack of a standard code of practice has been perplexing to the prospective bus operator.

In offering within these covers the results of intensive study of the bus operator's problems, the purpose has been to record the present knowledge and prevailing opinion, incomplete and tentative as much of it may be. However, enough has been learned of the present trend of the industry to make this book of value, both to those now engaged in bus operation and those who contemplate it.

But for the timely advice of numerous experienced bus operators, many of the pitfalls in the path of the uninitiated could not have been disclosed as they have been in this book, nor many of their valuable suggestions incorporated and only through the co-operation of the traction companies has it been possible to present the lessons which have been learned through years of experience in serving the traveling public. Unfortunately it is impracticable to give individual acknowledgment of the invaluable assistance which these broad-minded authorities have rendered; but in thanking them collectively, it is hoped that they will find in these pages a few hints which will partially recompense them for their pains.

The author was indeed fortunate in having at his disposal all the data accruing from the experience gained by the International Motor Company over a period of twenty-five years in the automotive industry, collected through its extensive field organization whose fingers are constantly on the pulse of bus development in every part of the country. They also wish to express their appreciation to Mr. M. C. Horine and H. E. Bardwell for their valuable assistance and hearty cooperation.

Roy Hauer.
Geo. H. Scragg.

CONTENTS

CHAPTER I

THE GROWTH OF THE BUS INDUSTRY

PAGE

Wherein it is shown that buses and trolley cars both have their proper place, although in some cities buses have supplanted trolley service. The type of equipment is governed by conditions of operation. Trolley construction has reached the saturation point and so the traction companies are turning to the bus for the rendering of complete and efficient transit. 1

CHAPTER II

SELECTING PROFITABLE BUS FIELDS

In which is shown how the peculiar advantages possessed by the bus make it a necessity and why much study should precede inauguration of service. The effects of governing factors, such as whether city or suburban service is to be rendered, population density, riding habits, pavements and grades are analyzed to indicate proper determination of profitableness of enterprise and the number and types of buses required. Some hints on co-operation with interurban electric and steam railroads and on surveys in general 6

CHAPTER III

SECURING THE RIGHT TO RUN

Concerning the bus line as a public utility and giving a digest of State measures for their regulation. Suggestions for securing Certificates of Public Convenience and Necessity, for meeting municipal requirements, for securing petitions and evidence for hearings, and enlisting the co-operation of civic bodies 29

CHAPTER IV

PASSENGER TERMINALS AND WAITING ROOMS

Setting forth the importance of terminals and their establishment and economical maintenance. Suggestions on auxiliary revenue, consolidation of terminals, their location, etc. 75

CONTENTS

CHAPTER V

SELLING THE SERVICE

PAGE

Covering public relations in respect to character of service and drivers; advertising and publicity; safety campaigns and participation in civic movements. Hints on literature and appearance of equipment. Suggestions on civility, speed and baggage. 91

CHAPTER VI

OPERATION

Outlining methods of training drivers, inspection of equipment, maintenance and overhaul, purchasing and cleaning with some examples from experience. 114

CHAPTER VII

INDIRECT AND SUPPLEMENTARY REVENUE

Discussing revenue in general, together with hints as to how income from bus-line operation can be augmented. These hints include not only the profitable uses to which the vehicles can be put but show how additional revenue can be derived from advertising, etc. . . 158

CHAPTER VIII

COSTS

Methods of keeping cost records are described in detail. 179

CHAPTER IX

SELECTION OF EQUIPMENT

Regarding all of the points which the prospective operator should give earnest consideration before actually purchasing any buses. These include not only bus manufacturers in general, but cover all of the units of the bus which are most closely allied with profitable operation. 206

BUS OPERATING PRACTICE

CHAPTER I

The Growth of the Bus Industry

THERE seems to be a tendency for the general public to believe that a fight to the finish must ensue between the Street Railway Companies and bus operators. This is not a new idea but merely a repetition of the ideas promulgated during the early years of motor transportation. Another finish fight was foreseen in this case between the horse and the motor truck. The fact that vision is but imperfect when the object looked at is too close to the eyes, was again proved. The advocates of horse drawn transportation could see no value in the motor truck. On the other hand, the new school of motor driven transportation pitied the old fashioned individuals who would not concede that the horse as a freight animal would soon disappear from the streets. Time has lent perspective, and there is no one but who will admit that there is no fight between the horse and the automobile. Each has its own field of endeavor. It is common knowledge that where the volume of freight is small and where the vehicles must stop at frequent intervals to pick up and deliver, the truck cannot hope to compete with the horse so far as economics are concerned. Again, the motor truck has opened new fields—distances and weights which were previously prohibitive, are now only incidental items in motor transportation.

Why then, should the Street Railway Companies and the bus operating organizations fix bayonets? The tea kettle and the frying pan both spend a large proportion of their useful lives on the stove. Both are cooking utensils; but, one would not fry eggs in the tea kettle, or as a general rule, boil water in the frying pan. The very fact that both trolley cars and buses owe their existence to the peoples' desire to travel, does not constitute an excuse for one to call the other a usurper. The trolley car has its field, and always will. The bus, on the other hand, has work for which it is eminently fitted, and always will have.

During one year, thirteen cities in the United States supplanted their trolley systems by buses. This does not necessarily mean that the life of the trolley is on the wane. A study of the operating conditions in those thirteen cities brings to light the fact, that in some cases at least, the operations involved were not of a nature to make successful trolley service possible. They were pre-eminently motor bus operations, and it is only unfortunate that the motor bus had not reached its present state of perfection when the original plans for city service were laid out.

The investment entailed by the installation of an electric trolley system is tremendous. Tracks must be laid and serviced; power plants must be built and maintained. Even the vehicles themselves cost considerable sums of money, but if the volume of traffic warrants these expenditures the trolley system is operating in its own field and no change should be either required, or desired.

Unfortunately for the trolley company all of the population cannot live on the present routes, and in fact, as there is a general tendency for manufacturing and mercantile concerns to replace residences along busy thoroughfares something has to be done to augment the present transportation lines. In other instances, and occasioned by the very fact that people are moving away from the immediate vicinity of trolley lines, the question has arisen as to whether or not the trolley lines should follow the receding population. In most cases the answer has been in the negative. It does not pay to lay trolley tracks unless a steady flow of considerable magnitude is assured.

Electric lines some years past extended in all directions without much regard to density of traffic; some were actually built with less than 300 density to the mile. According to rail authorities this is trackage which should never have been built and had much to do with rail depression in after years. It was a repetition of the steam roads' exploitation in England in 1840 and in the United States in the 70's. Electric rail mileage extension has been reduced from above 1300 miles per year in 1910 to an average of approximately 200 miles per year for the past four years. From these latter extensions must be deducted abandonments. At the rate of construction before 1910 electric railways were seven years behind in the ratio of mileage to population it bore in 1910 and since there is little hope of catching up in the immediate future, due to cost of construction, the bus offers immediate relief with smaller investment. It costs 75 per cent more to-day to build and equip electric railways than it did in 1910, and rates are only 58 per cent higher on the average. Cost of operating, as to the same volume of traffic, is 90 per cent greater. Furthermore rail interests have fixed charges which are 100 per cent greater per mile while at the same time the net earnings are less on the same volume of traffic. The rail lines have great difficulty in showing the necessary return on their investment at present prices.

The traction companies, therefore, are assuming the attitude that the bus is the street railway car's little brother. Time alone will tell whether the bus is the little brother, or whether, in many localities, the bus may not have outgrown its short trousers.

That the traction companies have accepted the motor bus as having a legitimate place in community life is conclusively proved by the number of such companies who have found it necessary to enter the bus field themselves. In Great Britain there are approximately twenty-nine electric railway companies operating in their various territories. Of these about half operate separate motor bus service. In order to prevent passengers from riding on the buses rather than on such of the track lines which overlap the bus routes, an extra high fare is charged to keep the facilities of the motor buses for the long distance suburban riders for whom they were inaugurated.

In the United States many of the traction companies have found that the bus is their best ally. They are using buses extensively for feeder lines and for maintaining schedules through localities where the volume of business does not warrant the investment entailed by trolley service. The United Electric Railways of Providence, R. I., estimate that $9,400,000 has been invested by electric railway companies to date in motor bus and garage equipment. They predict that $6,000,000 will be spent in 1924. Railway purchases of motor coach equipment thus far in 1924 increased over 300 per cent. One hundred and forty-three railway companies out of 820 operated 1350 buses on January 1st, 1924. As the months go by more and more of the remaining 677 will see the light and fall in line.

Even though the logical field of the motor bus is in its co-operation with other forms of transportation, it has been proven beyond question that buses can replace trolley cars. During the month of August, 1923, a trolley strike occurred in Newark, N. J., a city of 500,000 inhabitants. After but a short transitory period 675 motor buses took the place of 800 trolley cars. During that month these buses took in $525,000 in addition to $75,000 which went to suburban buses. Jointly, they carried 11,000,000 passengers. In 1916, the buses in

Newark carried 2,600,000 passengers, while in 1922, they carried 76,375,000. There were seventeen bus lines operating in Newark, covering a mileage of 130 miles, no route being less than five miles long, and some exceeding ten. All these lines were operated on a co-operative basis. The profits were pooled, with the result that there was no direct competition. An analysis made of the bus operations during the year showed that there was considerably less traffic congestion on the busiest streets, fewer accidents, and that traffic moved approximately 35 per cent faster than when the trolleys were operated. The sequel has been that the traction company has seen the trend of the time, and is now operating fleets of its own buses in conjunction with the existing trolley lines and have taken over many of the lines mentioned above. Paterson, N. J., was thrown into a trolley strike during the same period, and the 164 buses which were pressed into service by the municipal government handled the 100,000 passengers so well that buses in general have won great popularity there. Throughout the country one traction company after another has fallen into line.

The State of California, to cite a typical example, is a particularly prolific bus field. The motor buses of California have reached such a high state of development that bus operators everywhere are turning their eyes to the West to foresee the general trend of motor transportation. On June 30th, 1923, there were 246 motor buses carrying passengers only, 125 carrying passengers and freight, 62 carrying passengers and express, and 25 carrying combination loads. Five of the operating companies report gross receipts in excess of $400,000 in a year. Four report receipts of between $200,000 and $300,000 and seven, more than $100,000. The revenues from all of the lines totaled $15,549,349.94. This revenue was derived from 21,221,928 passengers, and over 500,000 tons of freight carried during the year.

CHAPTER II

Selecting Profitable Bus Fields

REGARDLESS of the attitude taken on the general subject of track transportation and rubber-tired transportation, the bus does have certain advantages which cannot be gainsaid.

1. Bus lines have greater flexibility than trolley lines. Non-paying routes can be abandoned, while others can be lengthened to take care of expansion.
2. Bus systems can be more promptly installed and operation started.
3. Bus lines require less investment in rolling stock, housing, and repair facilities.
4. Unlike trolley systems the failure of one vehicle affects only that vehicle and does not tie up the entire line.
5. Routes can be diverted in case of fires, parades, or other obstructions.
6. A higher average speed can be maintained through congested areas as buses can pass each other, and also wind in and out of traffic.
7. Rapid and flexible bus operation relieves congestion on crowded streets.
8. Buses provide cheap and healthful recreation. They run on rubber, and there is no jolting occasioned by steel wheels running on steel rails.
9. An entire bus system, such as used for sight seeing purposes, can be moved from one point to another with but little inconvenience and cost. Buses can be operated at resorts where traffic is heavy during certain seasons and moved to other localities when the demands for their use ceases.

10. Buses are always in great demand for private hire.
11. In the winter time they can be heated by exhaust gases without additional expense.

Much Study Must be Given

When the establishment of a new bus line is contemplated just as much thought must be given the subject as when an individual considers the advisability of entering any mercantile or manufacturing field. In fact, in most cases considerably more thought is justified.

Remarkable success in chain store operation is due, largely, to the investigations made by the companies into the possible business which they could get out of a locality into which they contemplated entering. This not only takes into consideration the population, but the character of the population and its possible purchasing ability.

In the past, it has been the practice of people to go into the bus business with very little knowledge of the conditions which will make their lines successes or failures, and in spite of this they have sometimes succeeded. With increased competition, however, it is becoming more and more important that those who contemplate the starting of bus lines investigate very carefully the factors that govern the success of the operation.

The trial and error method of selecting a bus route in the past frequently resulted in profitable operation, but often regular and unavoidable operating expenses make short work of uncertain income and financial disaster may follow.

City vs. Interurban Service

Contemplation of the advisability of entering the bus field should be made along certain well defined lines. In the first place bus operation in general is divided into two classifications, namely, city operations and suburban operations. Each of the two has characteristics which make it impossible for either to be classed with the other. Of course this does not mean that an operator may not enter both fields, as many companies run fleets of buses both in cities and out from the same cities. It does mean that in the initial investigation they should be considered as two separate and distinct types of operation.

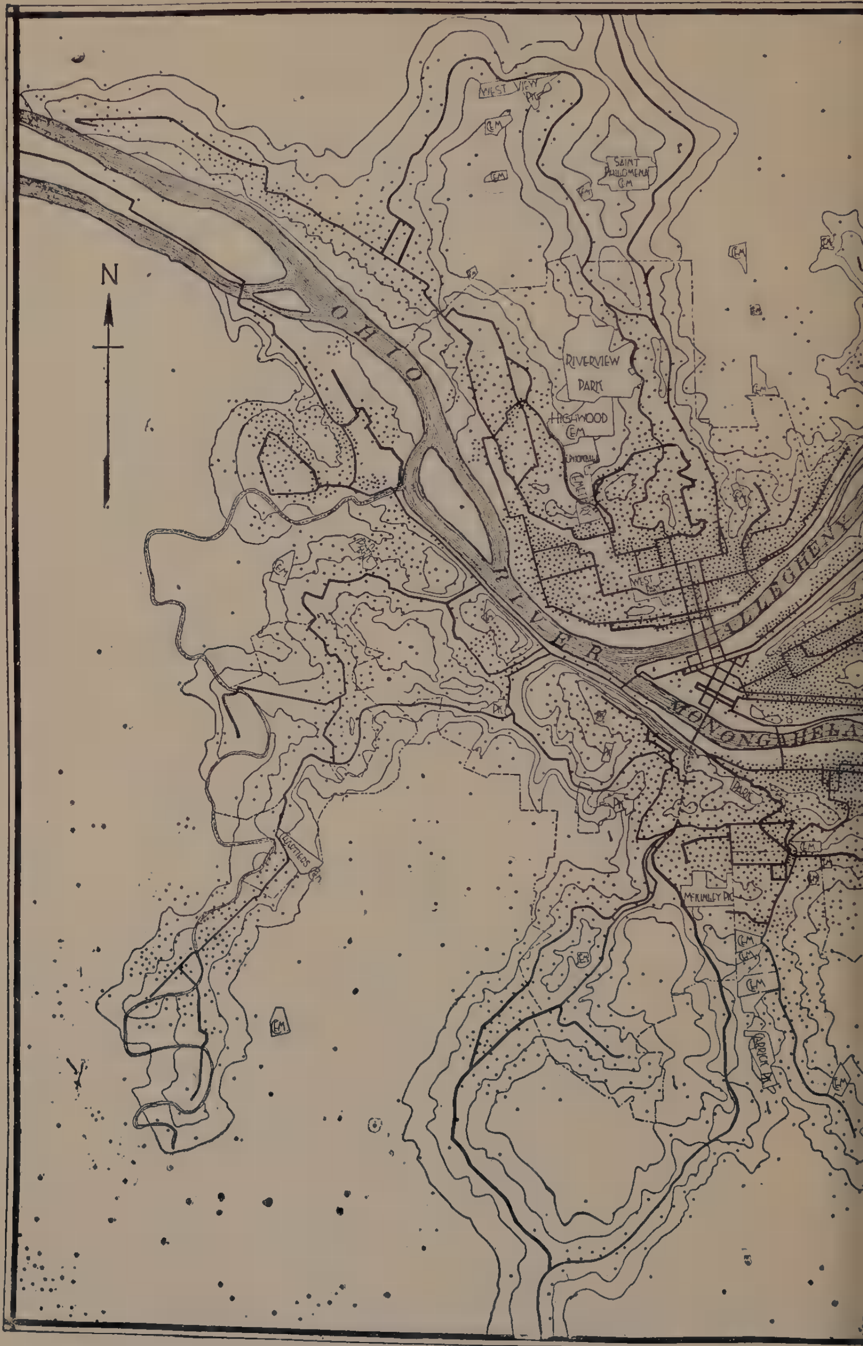
In the main, the two classifications differ as follows:

Buses operated in cities or towns:
- Have comparatively short routes
- Must have provision for standees
- Have no demands made on them for extreme comfort
- Must run at short headway during certain portions of the day.
- Must run over routes which will serve the greatest number of people.
- Must be operated at a minimum fare.

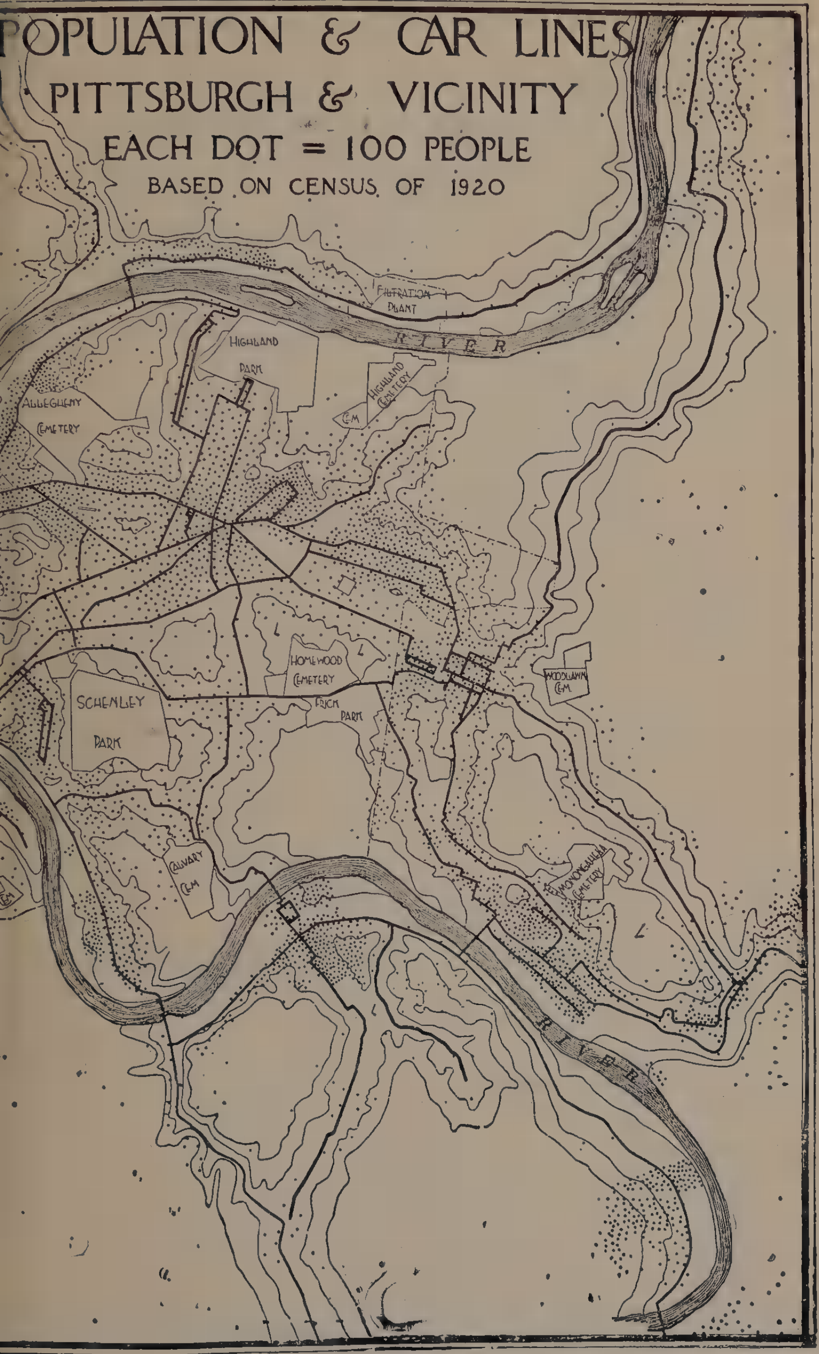
Interurban buses:
- Have longer routes
- Must have seats for all riders
- Must offer the utmost in comfort
- Must be very reliable as to schedule
- Must have provision for baggage.
- Can be operated on mileage tariff

City Bus Lines

While the above are but the high points, it can be seen that the two must not be confused in the mind of the prospective operator. In either case a survey must be made before any money is spent. This survey should cover all of the features which will in any way affect income or expenditure. Every minute detail should be given its due consideration as the success or failure of future operations depends to a great extent on the result of this survey. Regardless of its apparent complexity a transportation survey is merely the application of common sense. Accordingly, any examples which might be cited herein must be taken merely as illustrations of what



A DENSITY MAP OF THIS TYPE WILL QUICKLY INDICA



WELL A PROPOSED BUS LINE FOLLOWS THE POPULATION.

might be done under given circumstances and not as general rules.

The first question which must be asked is: Are the present transportation facilities adequate? If they are all that could be desired, there can be no need for a bus route. However, this question is hardly ever answered in the affirmative, and consequently there is in practically every city, some locality where the present facilities are not ideal. Assuming, then, that a bus route is contemplated which will serve as a means of communication between this unserved locality and the downtown business and shopping center, the next step is a determination of the number of people without direct and adequate means of transportation.

Density of Population

One of the best methods of visualizing the density of population is by means of an outline map on which dots have been placed, each dot representing 100 people. A typical example of such a map is on opposite page. This map was prepared by the Citizens' Committee on City Plan of the City of Pittsburgh and shows at a glance the various congested districts and their distances from the various transit lines. The previous preparation of such a map makes it a very simple matter for a prospective bus operator to lay out his routes in such a way that they will serve the maximum number of people. However, this condition is ideal and consequently in the great majority of cases previously-prepared maps will not be available. In many cities committees representing welfare organizations have given some consideration to the subject of local transportation facilities. In such cases the reports of these committees will prove of great value. The majority of those who contemplate the operating of bus lines must make their own population analysis.

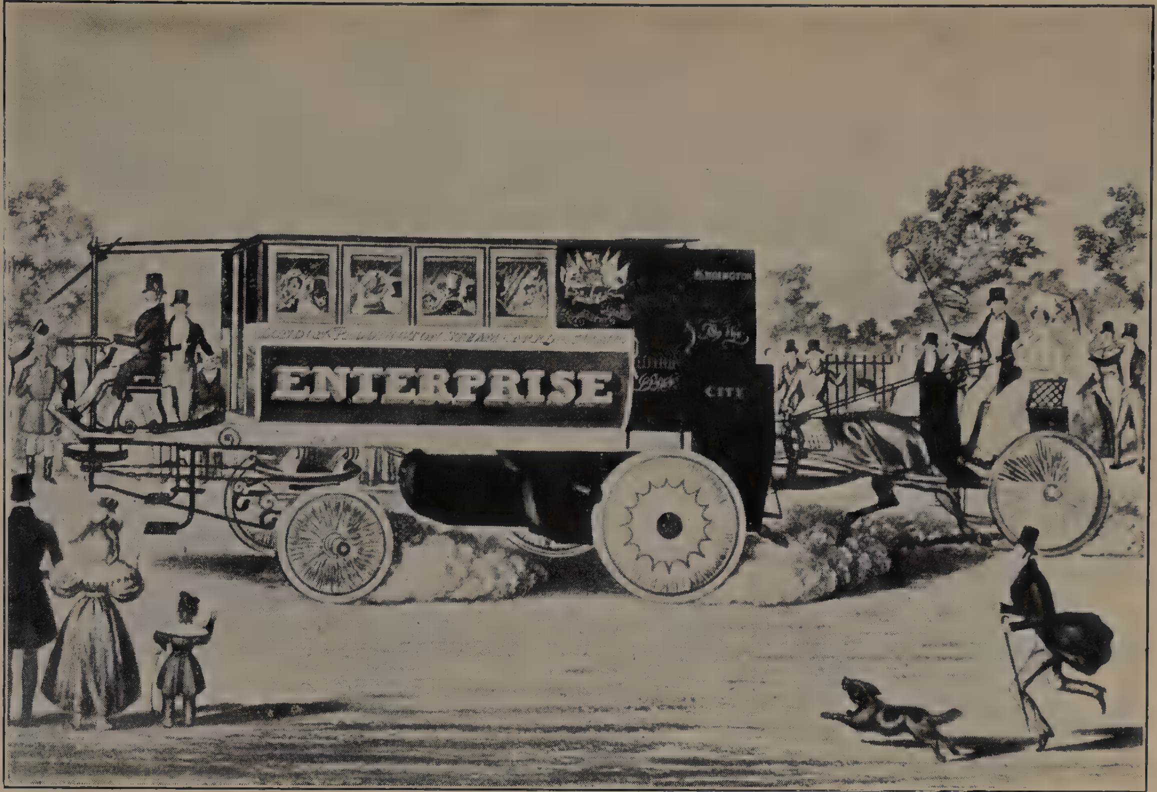
Much information of this kind can also be obtained through the Chamber of Commerce, Voting Commissions, Department of Public Works, Gas Companies, Electric Light Companies or other public service organizations.

Not All of Population Will Ride

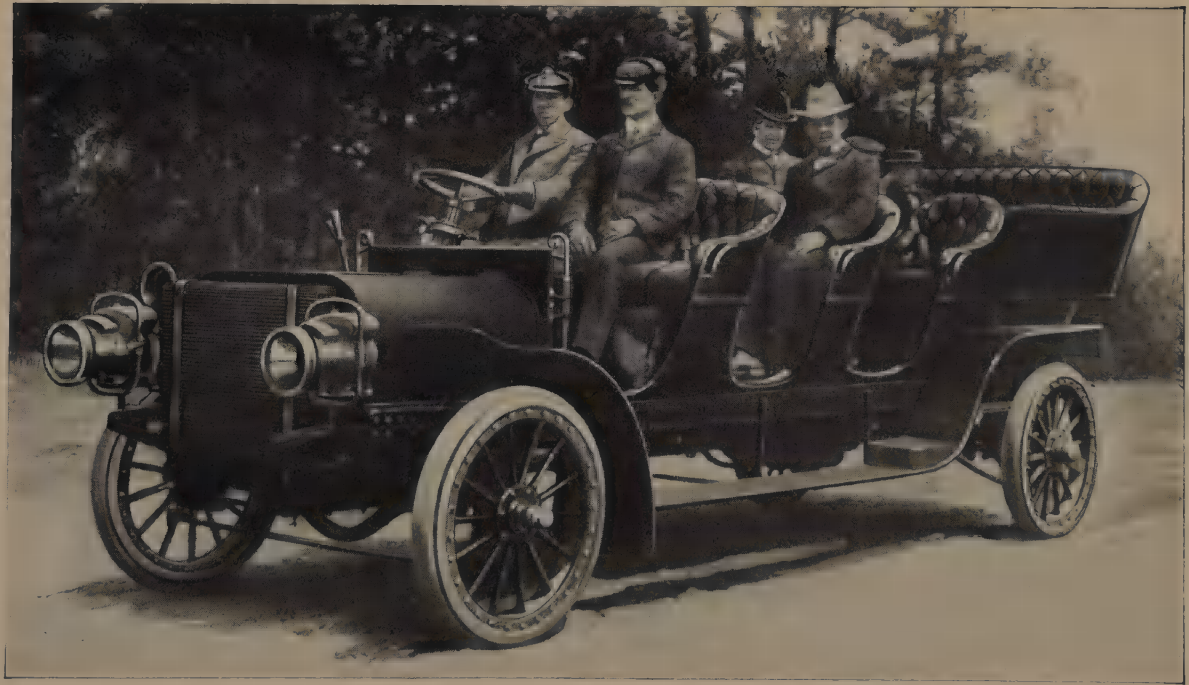
Following the general idea of the dot map previously referred to, a personal survey can be made of the locality which the buses are to serve. An outline dot map, while not of any particular value as an index of the number of people residing in any particular territory does, however, convey a clean-cut and precise conception of the distribution of the inhabitants. Having proved to oneself that the number of prospective riders is available and that their distribution coincides with the general plans for the bus route, the next step is to go over the territory with a car, covering all of the streets in the neighborhood. The reason for so doing is that, as a general rule, 90 per cent of the population within one-quarter of a mile of the proposed bus route can be considered as future patrons. When this particular route is the only transportation facility available, this area can be increased to one-half mile. Thus, it can be seen that a indirect route running through a band of comparatively dense population, even though it be considered longer, can better serve the ends of the operator than a direct route which will skirt some of the thickly populated localities.

City People Ride 210 Times a Year

Analyses made during the past year of many of the transportation systems operating in this country have brought to light the fact that in cities of more than 40,000 inhabitants the average number of rides per inhabitant is 210. In other words, every man, woman and child in the city will make an average of 210 trips per year. Based upon past experience then, this average can be used as a basis of comparison. However, there are many things



BUS TRANSPORTATION OF THE EARLY NINETEENTH CENTURY.



AMERICA'S FIRST GASOLINE DRIVEN MOTOR BUS, 1900.

which can vary the value of this average figure. In the first place riding habits are not formed entirely on the merits of the available transportation facilities. They are affected greatly by the character of the people residing in the various localities which make up such a city. This does not necessarily mean that the people on the highest social plane have riding habits developed to the highest degree, nor, on the other hand, does it follow that those of the lowest type have riding habits developed to the lowest degree.

Development of Riding Habits

Those inhabitants who are generally considered to be of the highest type socially may never have entered motor buses owing to the fact that their own private cars serve them better. This argument need not be carried to its logical end to show that riding habits are not measured on the social scale. The fact that riding habits have been developed in the past, along certain lines, does not necessarily mean that there will not be very marked changes in the future. Women who would not shop in anything but their own private cars are beginning to appreciate the freedom and lack of care which a well appointed bus line can give them. In the same way, people of extremely low order have developed tendencies which were entirely unforeseen.

Passengers on Same Social Level

Regardless of the fact that there is no direct index of riding habits, one or two fundamentals must be kept in mind: In the first place, it is not good policy to cater to types of people who are too far apart on the social ladder. The steady, industrious citizen who constitutes a very high proportion of the motor bus customers will not continue to ride, if forced to rub shoulders with individuals who are not overly particular about their own personal appearance. The best results then, can be obtained when the line caters to one particular type of rider traveling in the same direction, at the same time. There are, of course, many bus lines that are forced to depend on mixed loads but it is usually found that the tone of the line is lowered and as a result much revenue is diverted to other channels.

While the population of a locality must govern the route to a great extent there are other factors which must be given due consideration:

Pavement Condition Very Important

The condition of the pavements should be kept in mind when making the survey. Bumpy riding has a bad effect on the morale of patrons and consequently reduces revenue. Bad pavements also have a correspondingly detrimental effect on the vehicles themselves, thus increasing operating expense.

Hills Must Be Considered

The topography of the territory should also be considered. Topographical conditions, of course, already have had their influence on the population and the greatest population has naturally settled around the thoroughfares that lead most directly into the business and shopping centers. However, long and steep hills should be avoided wherever possible as they also increase operating costs and people are not averse to walking a short distance when they are assured that they will make connections with a bus operating on a definite schedule and which will take them to their destination in the shortest possible time.

Tentative Route Should Be Gone Over Many Times

After laying out a tentative route, which seems the best solution to all of the foregoing problems, this route should be gone over a number of times, at different times during the day. Notation should be made of all of the points of interest on the route:—the theaters and amusement parks; the business and shopping centers; the factory and residential districts. These should all be coordinated with the number and types of people who may want to travel to or from them. A study of the people along the route, will bring to light the fact that during different times of the day the buses cater to different types of people and that the travel flow may be in several directions at the same time.

While traveling over the route on the survey, the speed should be kept down to that which the buses will make, making allowance for stops at those corners where passengers will normally get on or alight. In this way a running time between terminals and the number of runs that can be made per hour during peak loads can be determined.

What to Get from a Survey

The result of such a survey will be three-fold. It will show where the people in the district will want to go, when they will want to go, and approximately how many can be relied upon as a regular source of revenue. For instance, an ideal condition would prevail if during the morning rush period factory and industrial workers traveled in one direction, while store clerks traveled in the opposite direction after which department heads and executives from the above mentioned factories would take the "up" buses while the business men of the city took the "down" buses. Such a condition being ideal, does not often obtain, but it can be seen that a thorough survey of the territory covered by a line can be made invaluable in the determination of the headway which the buses must have, if they are to serve their purpose satisfactorily. The legal requirements in some territories demand that the authorities issuing the operating permit shall specify such details as schedules to be maintained, and fares to be charged. In such cases the operator can only act in an advisory capacity, but insomuch as most local boards are not overly familiar with motor bus operations, the advice of the prospective operator is often both solicited and acted upon.

Traction Company Surveys

Surveys made by traction companies are usually the result of popular demand for either feeder lines or additional direct routes. Traction companies must keep their fingers on the pulse of the local population and as a result, will provide transit facilities which are within reason. But, there is another aspect of the case:

Pavement Replacements and the Traction Companies

In the days of the horse-car the paving between the rails was chargeable to the operating company insomuch as it was considered that the horses which drew the cars had the most destructive effect on that portion of the pavement. In most instances this relic of the past is still in force and traction companies throughout the country are forced to pave between the rails at their own expense.

This item is of grave consequence on all save well paying double track routes. Such routes, however, are in the minority for rail transportation cannot well be supported on a population density of much less than 1500 per mile of trackage and many traction lines constitute an actual financial loss especially when their franchises demand that they maintain transportation facilities. A survey of all of the routes within a municipality will often bring to light the fact that a substitution of motor buses for trolley cars will wipe out many of the debit accounts. Whether the proposed line is to be operated by individuals or by the traction company, every attempt must be made to coordinate the new lines with the old. The best way to accomplish this is to arrange the schedules so that buses will make good connections with the street cars.

Transfers Increase Riding Habit

On a general average 50 per cent of bus riders will use transfers if they are available and while transfers do cut down revenue per passenger, they lend a feeling of confidence which has a very marked effect on riding habits with the result of an increase in revenue. However, care should be taken that lines are so arranged that passengers will not be forced to transfer unnecessarily.

Frequency of Service Influences Riders

There is probably nothing that influences the riding habit more than frequency of service. This is particularly true in towns that are so laid out as to require many routes of short length. The frequency of service can only be determined after the traffic survey. However, it can be borne in mind that if the average distance to be traveled is short, people will not wait for a bus, or in fact any form of conveyance, but will start walking. If they are well on their way before another bus comes in sight, they will continue their journey on foot with the result that a passenger is lost.

Very frequently not only will this fare be lost, but the habit of walking will be developed with the result that no consideration will be given to the bus for further trips of the same distance.

Type of Bus Most Suitable for City Use

In the operation of buses the aim should be to secure a low mile cost rather than a low seat cost. At the present time experience indicates that the 25-passenger capacity single-deck bus in city service enjoys a wide margin between its cost of operation and its revenue-earning potentialities. That is to say, the operating costs of larger or smaller capacity buses in relation to this type, all other things being considered equal, do not vary in either direction as much as their respective potential earning powers. Consequently the 25-passenger bus has been accepted by many, it is believed, because of its greater efficiency and economy of operation under the average normal conditions. It is most efficient in handling traffic during peak load hours and is large enough to provide comfort and a seat for every passenger during the off-peak hours. The assurance of a comfortable seat at these times enhances feminine patronage when traffic is most desirable.

Large Capacity Vehicles Result in High Costs

Often there is a temptation to use a larger seating capacity body, which when loaded with rush-hour standees creates a weight beyond the carrying capacity of the chassis. Not only are extra strains thrown on all working parts, such as the engine, transmission and axles, but the tires are subjected to loads beyond their manufacturer's rating. Such overloading can result only in rapid depreciation of the bus chassis and an abnormally high operating cost, because of the inability of the engine to maintain the fixed operating schedule.

It is generally conceded that the 25-passenger bus in most cases represents the optimum type. Buses of greater capacity are unable to maintain an increased revenue in proportion to their increase in operating expenses, while buses of smaller capacity suffer from decrease in operating revenue out of all proportion with the very slight decrease in operating expense. Of course it is not to be understood from the above that the large capacity or the small capacity bus are without a definite and legitimate field; for under conditions of exceedingly dense traffic for considerable distances, double deckers of as much as 65-passenger capacity are often well warranted while in many cases passenger capacity considerably below 25 may be the maximum requirement. These applications, however, are the exception rather than the rule.

The Number of Buses

Three conditions govern the number of vehicles required in any operation:

1—the length of the line
2—the minimum headway which must be maintained
3—the type of bus selected.

It can be seen at once that the relationship between the length of the line and the headway is a matter of simple arithmetic. Given a route of a certain number of miles, the running time between terminals can be definitely determined by going over the route carefully by automobile at various times during the day. This preliminary survey will establish the average speed at which the buses can run. For instance, if the route is five miles long and the average speed is ten miles per hour over the entire route, the running time between terminals will be 30 minutes. However, while one bus is maintaining its schedule it must be followed by others, each passing a certain point along the line at a definite time. The distance apart, or headway, of course depends on the volume of traffic which will vary at different times during the day. Assuming that traffic warrants the operation of buses at five minute intervals it will of course require six buses to maintain a five minute headway. However, the five minute headway need only be maintained during peak hours and if during the remainder of the day a ten minute schedule will take care of all the patrons of the line, three buses can be sent back to the garage.

These three buses need not constitute a loss as in Chapter VII various ways of using them are described more or less in detail.

In determining the number of buses required there is another factor which must be considered. No piece of machinery can be relied upon to operate indefinitely without occasional breakdowns. It follows therefore that if six buses are required to maintain a five minute schedule during rush hours and these six are all the vehicles on hand, a breakdown of any kind will entirely upset the schedule. Additional buses must therefore be kept in reserve. It is in this connection that the type of bus selected has its greatest effect. High grade machinery will not only last longer but will function with fewer breakdowns than low grade and if the buses are of the highest type obtainable the reserve can be kept down to a minimum. If, however, unreliable buses are purchased it will be found that more and more reserve buses will be required. If the equipment has been purchased wisely one reserve bus should suffice in a ten bus fleet although no definite rules can be laid down to cover this subject as there are so many factors which may cause the physical failure of buses. For instance the topography of the country has considerable effect on the rolling equipment. Drivers vary greatly, some treating their buses harshly while others succeed in driving in such a way that few road breakdowns occur.

Interurban Bus Lines

Previous to 1910 steam railroad extensions averaged about 4700 miles yearly. From 1910 to 1915 they retrenched on this program and averaged only 2700 miles yearly. Since 1915, due to increased construction costs this average dropped to 500 miles yearly.

The population of this country has increased 18 per cent since 1910, while the steam railroad extensions have only increased 4 per cent. If the railroads were to maintain the same ratio of trackage in 1924 that they did in 1910, they would be forced to build 30,000 miles of road. Steam roads have met the same adverse conditions as did the electric lines when they contemplated such extension work; namely, 75 per cent increase in cost of construction, while the cost of operation for the same volume of traffic is 90 per cent higher. With fixed charges twice as high and their earnings less on the same volume of traffic, the cost of extension work is prohibitive.

There are about 430,000 miles of surfaced road in this country. Motor buses entail small initial investment and are able to operate on low traffic density. They are flexible as feeder units.

Bus and Steam Road Co-operation

The financial success of steam railroads depends absolutely on the density of traffic on and tributary to their lines. In the past surveys made by railroad engineers for traffic density, consideration has been given only to that area which was within horse travel distance from the stations. The motor bus has enlarged the area served by the railroad. Whether railroads operate their own feeders or not, bus lines are of value to the railroads and the general trend of bus development seems to point to the bus as the economic medium through which the railroads can meet a situation which may become even more distressing.

The principal uses of buses in connection with steam railroads are as follows:

On routes not served by railroads.
As relief units on routes now served on broken schedules.
Substitutes on lines unprofitable due to low density.
Feeders to operating lines.

Because there are 430,000 miles of surfaced road in the country it does not follow that every mile will support a bus. There must be necessity for considerable travel or else any means of transportation will be a drug on the market.

In the past, the idea of connecting two or more centers of population by a bus line has generally originated in the mind of someone along the route who has been engaged in the livery or taxi business. He has usually started by taking such fares as become available from time to time and as local conditions caused the number of these fares to increase he formed the nucleus of a bus line. Operating in a hit or miss fashion, he may or may not have succeeded, but if he found his venture a financial success, it was in spite of his methods of operation rather than because of them.

In the future bus operations will be in the nature of business promotions. The routes will be laid out along certain definite lines. Analysis of operating conditions will be based on facts and surveys will be made which will cover all of the phases of successful bus operation. Some of the factors which must be considered in an interurban bus line survey will now be discussed.

Factors of Successful Operation

The governing factors of successful bus operation are as follows:

1. Actual and potential passenger traffic.
2. Suitability of the equipment for its work.
3. The management of the organization.

Management and equipment are subjects which will be taken up in subsequent chapters. As in the case of the city bus lines, the first thing to do in contemplation of the establishment of interurban lines is to analyze all of the phases of inter-city bus operation. An interurban line will draw its patrons from a number of centers of population. Every line will have two terminals which may be considered as primary and secondary terminals. In the majority of cases the line will run through other centers of population and will therefore have intermediate sources of patronage. Furthermore, all territories have more or less floating population. This tributary source can only be estimated in a very general way, except where the type of people are all of one class. Patrons of bus lines may be classified in general as follows:

- Regular or Habitual Riders:
  - Commuters
  - Industrial workers
  - Scholars and Teachers
- Occasional Riders:
  - Shoppers
  - Farmers
  - Pleasure Riders
  - Tourists
  - Salesmen
  - Church-goers
  - Week-enders

It can be seen at a glance that the first classification will be drawn entirely from the fixed population of either the primary, secondary or intermediate centers. The second classification includes either fixed residents or portions of the floating population.

In the case of the city type route it has been shown that out of a gross population of 40,000 or more the inhabitants average 210 rides per year. No such parallel can be drawn however in the case of interurban operation, as there is no direct relation between the population of the terminal cities and the riding habits which will be formed.

Of course, this does not mean that a line may not expect more patronage when operating out from a large city than from a small one, but it does mean that there are phases which have greater effect on riding habits as applied to interurban lines, than mere population.

Reasons for Riding Affects Patronage

One factor governing patronage is the reason for traveling. For instance if there is a residential section at one point on the line and a manufacturing center at another, the reason for travel has been supplied. Again, a farming community around various intermediate points along the line and a mercantile and shopping center at one of the terminals constitute a reason for a bus line's existence. In fact it is never difficult to tell whether or not there is good reason why a profitable patronage can be relied upon.

If there is a state capital or county seat on the line, commercial travel will be highly augmented by pleasure seekers and sight-seers in addition to those who would naturally visit such centers to transact business of a legal nature. If there is a college or other educational center located within ready reach of the bus line the student travel will be high, but of course student travel may be intermittent, reaching its peaks during certain portions of the year and ceasing altogether during other portions.

There are no definite rules by which it is possible for a prospective operator to tell in advance how many of a given population he can rely on as patrons, but of course there must be enough population in the immediate neighborhood to warrant any form of transportation. Therefore, having assured himself of a source of revenue and having established a reason why a certain class of the population desire to travel over the route which he intends to develop, the next step is a consideration of competition. If his line competes directly with the railroad, he should first be sure he can obtain the necessary certificates required in his state with which to start operation, but after it is established that his line does not constitute direct competition, the schedule must be so arranged and the routing so done, that he can take advantage of any lack of facilities on the part of the railroad. For instance, traveling salesmen cannot afford to spend several hours in a town after their business has been completed and if forced to do so by gaps in the train schedule will welcome the service of a bus line which will permit them to reach their next points of call without delay. The educational centers referred to above rely to a considerable extent on the patronage of the younger generation residing within an area more or less near the college. If the volume of traffic warrants, the railroads will, and do, run trains on schedule which will permit these students to get to school on time, without starting from home too early. However, in the majority of cases student travel is too uncertain and too intermittent to permit the running of extra trains and some railroads welcome the establishment of a bus line having a schedule which fills the gaps in their own.

Effects of Length of Line

Up to a certain limit, the length of the line has no direct effect on operating revenue owing to the fact that interurban fares are based on mileage. A line operating between two terminals usually draws most of its patrons from these terminal towns and therefore that the reasons for travel must be extremely well established.

If, however, there are a number of intermediate towns it will be found that the residents along the way will have various reasons for traveling and so traffic will move in a more or less steady stream not only between terminals, but on short rides along the way. It can be said, therefore, that the number of riders will vary directly with the aggregate of the intermediate town and village population. However, the greater the distance between these centers of population, the less will be the direct revenue owing to the fact that residents will not ride if the cost is great, unless compelled to do so. They will, however, patronize a bus on which the fare is low when going on errands even of a trivial nature.

Bus vs. Railroad Travel

Lessons drawn from interurban lines prove the advisability of extending a prospective bus line through as many intermediate centers as possible, provided the distance between terminals is within reason. Up to a distance of from 50 to 60 miles, approximately, people will ride on buses regardless of the fact that better time might be made by traveling on the railroad. There are several reasons for this. Buses travel on rubber and consequently are more quiet. Buses, as a general rule, are better ventilated than railroad trains owing to the fact that they are open at the front end. The rider on a bus is entirely free from coal dust and soot. However, for long distances, the bus cannot hope to compete with express trains except under certain conditions, for, as the distance traveled increases, the advantages derived by the bus over the steam line naturally diminish. This does not necessarily mean that bus lines cannot be operated over long routes as there are numbers of lines operating in this country making runs of several hundred miles in length.

Examples of this are afforded in various parts of the country, notably along the Pacific Coast where lines running from Los Angeles to San Francisco, a distance of 480 miles, connect at both ends with lines covering the entire Pacific Coast.

There are various reasons for the popularity of these regular long distance services, one of the most important being the fact that the motor bus line can be routed through the most scenic parts of the district whereas the railroad right of way is often unattractive and monotonous.

In other cases the bus line is necessitated by inconvenient breaks in the railroad schedule. This is frequently the case in the less densely populated regions because of the necessity of operating a complete train including baggage and smoking cars in addition to a day coach on every train, which involves so much operating expense that frequent schedules cannot be warranted where the traffic is sparse.

In several cases the bus line owes at least a large part of its popularity to the fact that the bus fares are actually lower than the railroad fares and the schedule time no greater. And yet, on these runs, owing to the conditions under which the railroad must operate, the buses are operated profitably while even the infrequent railroad service involves a loss.

The informality of motor bus travel, its more exclusive nature and many other minor advantages all contribute to the formation of riding habits which were not anticipated.

There are fifteen million automobiles in this country. These have educated the American public to ride on rubber. This is responsible for a large measure of the popularity of bus transportation.

The Collection of Data

During the preparation of the survey considerable aid can be obtained from figures from similar routes. Many of these figures can be obtained from the publications which serve the industry. In many cases it will be found that the operator of a successful line in the vicinity will be very glad to give the prospective operator the benefit of his experience pointing out wherein he suffered from inaccurate data and where he would have changed his method had he enjoyed the advantage of skillful guidance during the formative periods.

The annual reports of the regulatory commissions contain many statistics on bus operation. The states of

California, New York, Maryland and the District of Columbia all publish such reports and many pertinent facts will be found in them which can be applied to particular conditions.

In preparing these figures care must be taken to select just those which apply, keeping in mind that the length of the line, the character of the tributary population, the character of bus equipment and other local conditions all have their effect on the rides per capita which will be obtained.

Traction companies operating interurban lines when making bus surveys are particularly fortunate insomuch as from their own books they can draw parallel comparison. When compiling data from either published reports or from the books of private corporations, the following phases of bus operation should be tabulated:

1. Name of the Company.
2. Length of the route.
3. Predominating classes of patrons.
4. Population served.
    (*a*) In the locality of the primary terminal.
    (*b*) In the locality of the secondary terminal.
    (*c*) In the intermediate centers.
    (*d*) Tributary population (radius of three to four miles).
5. Passenger revenue.
    (*a*) per mile of route.
    (*b*) per capita served.
6. Average headway.
7. Hours of service.
8. Riding habit.

Where other figures do not seem to apply to any particular operation the following rule may be used as a guide, bearing in mind that it is nothing but a skillful estimate and may prove to be entirely false when applied to some operations.

It is believed that a population of 400 to 500 per mile will constitute a minimum for routes having headways of 60 minutes or less decreasing in proportionate ratio to approximately 100 for routes having schedules of but two trips per day.

As in the case of the city bus line survey a personal study of the route must be made, preferably by automobile. While going over the route one must be on the alert in order that none of the factors of successful operation will be overlooked.

In review, the following subjects should be studied:

1. The characteristics of the people in the various population centers.
2. The number and kinds of industries which the route passes.
3. Their probable stability.
4. The number of employees in each.
5. Points along the line where real estate developments may occur.
6. Other transportation facilities.
7. More, in general, he will note all recreation points; parks, lakes, picnic grounds, churches, fair grounds, theatres, motion picture houses, dance halls, and in fact all places where any number of people are likely to congregate for one reason or another, also estimating as to whether this traffic will be seasonal or at what time of day it will be most likely to occur.

In this connection it is worthy of note that recreational traffic is one of the most important branches of bus business. The revenue derived from this source may be considered entirely as profit as it can usually be obtained at a relatively insignificant cost.

Roads and Their Effects on Route

A map should be prepared to show the route, road, contours, the curves, the grades, the width of the highway, capacity of bridges, railroad crossings, recreation points and, in fact, all of the information possible that may have any bearing on passenger traffic.

Grades are particularly important as they have a very marked effect on maintenance and running charges and on schedules.

Even though a personal survey of the grades, checked against the maps in the offices of the State Highway Commission shows that there are no excessively bad grades on the routes, the routes should be gone over several times in order to check vehicular traffic. If the buses are to be continually slowed down by other traffic it might be advisable to extend the route somewhat in order to avoid badly congested roads. However, it must be borne in mind that transportation is a commodity, and that public convenience must be catered to. It would, therefore, be entirely unwise to lay more stress on the condition of the roads than on the needs of the communities served. In the small towns along the route, congested corners, bad turns and bottle-necks can usually be avoided by making short detours and as these detours cause the patrons no inconvenience, no ill effects will be suffered by the line.

All curves naturally cause an appreciable loss of time and therefore where possible sharp curves should be avoided.

The Number of Buses Required

The conditions which govern the number of buses are practically the same as with city lines. The only difference lies in the fact that interurban lines are longer and as a general rule higher average speed can be maintained. On the other hand the headways maintained are generally very much longer. For example an interurban line sixty miles long on which the buses can average twenty miles per hour would require three hours per single trip. But if the headway is one half hour, six buses would take care of the entire route. On interurban lines breakdowns are more serious in their effect on running time than on city lines.

CHAPTER III

Securing the Right to Run

AFTER planning the proposed bus line, the next essential step for the prospective operator is to procure from the proper government authorities permission to operate. Many an operator has been handicapped right from the start by attempting to operate before securing the consent of the proper authorities with results that not only proved costly but in several cases disastrous. Therefore, it is suggested that the organizer give this matter careful attention before taking steps toward the purchase of equipment or making any great investment of capital in the enterprise.

Why Bus Operation Should Be Regulated

On this the Supreme Court of the United States has had the following to say: "Property does become clothed with a public interest when used in a manner to make it a public consequence, and affect the community at large. When, therefore, one devotes his property to a use in which the public has an interest, he, in effect, grants to the public an interest in that use, and must submit to be controlled by the public for the common good, to the extent of the interest he has thus created. He may withdraw his grant by discontinuing the use; but so long as he maintains the use, he must submit to the control."

In other words, when a motor bus operates on a fixed schedule over a specified route established purposely for the convenience of the traveling public living in that community, it immediately becomes a public utility and as such should be controlled in the same manner and by the same government agency that offers protection to other public utilities. Such control is a benefit to the operator rather than a hindrance, for it protects his operations against indiscriminate competition, which, judging from past experiences in public utilities, is destructive to all concerned.

State Regulation of Buses

At present, there are thirty-five states which have enacted laws that provide control in a greater or less degree over bus operation within their respective boundaries. In the majority of these states the powers of control have been vested in their Public Service Commissions or similar state agencies controlling other common carriers. The chief powers of these state agencies as tabulated by the Motor Vehicle Conference Committee may be summed up as follows:

1. Grant, refuse to grant, amend or revoke Certificates of Public Convenience and Necessity.
2. Prescribe routes.
3. Fix schedules.
4. Determine character of service and promote the comfort and safety of the traveling public.
5. Establish fares and rates.
6. Require reports and uniform methods of accounting.
7. Examine accounts and records.
8. Supervise fiscal affairs such as incorporation, capitalization of stock, etc.
9. Compel additions to, extensions of or betterments in the physical equipment.

A Certificate of Public Convenience and Necessity is a certificate granting to the applicant the right to operate as common carriers over a specified route on a fixed schedule, which, by the evidence shown, would indicate that such a service is a convenience and a needed accommodation to the public living in the area affected by such operation. Some states call this certificate by other names, but in general its privileges are similar.

As the regulations and restrictions of each state differ from the others to a greater or less degree, we will comment on the regulations of each individual state later on in this chapter.

Municipal Regulation

Although some states vest in their state agencies complete jurisdiction over bus operation, whether an urban route, inter-city or interstate operation, a good many of them leave the matter of city bus routes in the hands of the proper agency of the municipal government within whose limits the buses operate. Consequently, the operator planning to operate buses within the limits of a city should first of all ascertain to what extent the local government's regulations, requirements and powers affect the granting of a permit. If the municipal government has complete juridisdiction over this type of bus route, then the prospective operator must file his application with the civic body in charge of the city's public transportation problems. Such matters are usually placed in the hands of the city's governing bodies as City Council, Common Council, Traffic Commissioner, Board of Aldermen or Board of Selectmen. When this is found to be the case, this municipal body will invariably wield practically the same powers as those listed under "State Regulation."

In the case of a proposed inter-city bus route, the operator will frequently find it necessary to apply for permits from both the state and municipal agencies; to the former for permission to operate *outside* of city limits, and to the latter for operations *within* city limits. Approval should first be secured from the municipalities in which the buses are to operate, afterwards applying to the state agency for the remaining permit. The approval of the municipal bodies will invariably bring a favorable decision from the state agency.

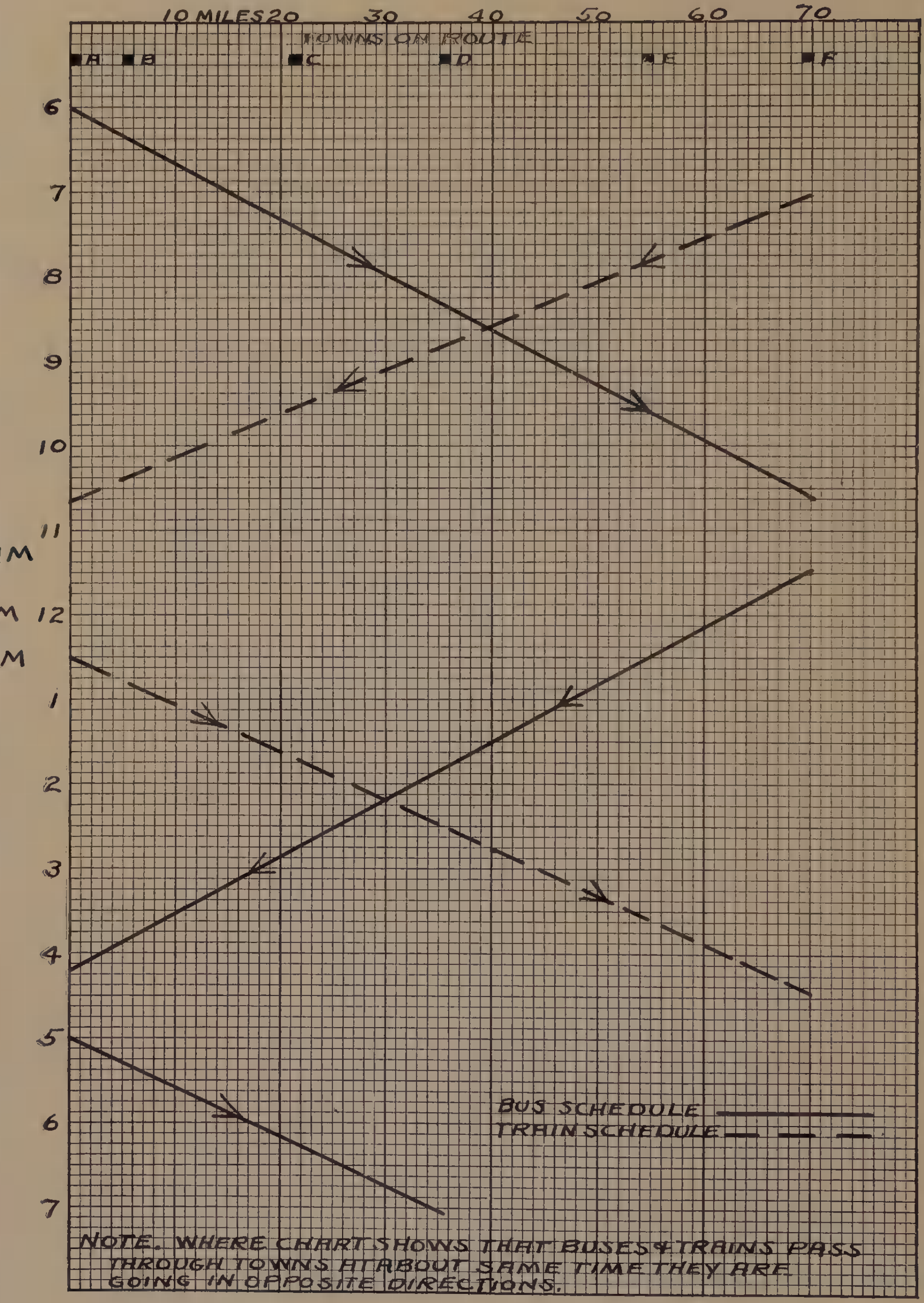
As yet the Federal Government has not seen fit to enact a law that would place inter-state bus operation under the control of the Inter-state Commerce Commission, the same as other common carriers. Consequently, the operator proposing to operate such a route must apply to the controlling agencies of each state in which his buses will operate, as well as to the agencies of the municipalities through which the buses will run.

Evidence for Hearings

At the time application for a bus route is filed, either with the state or municipal agency, or both, it is the usual custom to set a date for a public hearing to decide whether or not such a permit should be granted. At this hearing the prospective bus operator must present himself and make a plea on his own behalf for a permit to operate buses over the prescribed route, at the same time presenting conclusive evidence that such proposed operation would prove to be a convenience and necessity for the community at large.

The best kind of evidence to present at such a hearing is a petition signed by local civic bodies, such as the Chamber of Commerce, Board of Trade, etc., or a good number of responsible individuals residing in the vicinity which the proposed bus line would affect, stating that they favor its establishment. Such a petition or petitions would have a strong influence toward the board's decision in favor of granting the permit.

It is well that the operator gather as much favorable evidence as possible for these hearings in order to counteract any opposition that might be raised against such a project. And opposition is usually prevalent, es-



A GRAPH OF THIS KIND WILL AID MATERIALLY IN PROVING TO THE AUTHORITIES THAT THE PROPOSED LINE DOES NOT COMPETE DIRECTLY WITH EXISTING FACILITIES.

pecially in cases where the operation of the proposed line might affect the revenue-earning power of other transportation companies already in existence.

In instances where the proposed bus route will cover the same territory as an existing trolley line or railroad, but not operating on the same schedule, it would be to the bus operator's advantage to include with the application to the regulatory bodies, a graphic chart that clearly outlines the proposed bus operation in relation to that of the existing transportation companies.

A good example is given in the illustration below of how effective a graphic chart of this description can be made to point out that the proposed route and schedule would render an additional service to the communities rather than competing with the existing agencies. The graphic chart shown on opposite page is one that was submitted to a regulatory body by an operator, which helped materially in securing the permit to operate. A chart of this sort that illustrates both the schedule of proposed bus operations and that of the trolley or railroad operation, or both can be easily drawn. The horizontal lines represent the time of day, and the vertical lines the distance in miles of the proposed route. For the legend, solid, dash, dotted or different colored lines may be used to distinguish the different types of service, and arrowheads on the lines denote the direction in which the agencies move. With a time table of the trolley or train service and a blank graphic chart, which can usually be secured from a local stationery store, a descriptive chart of this sort can be drawn up in a short time and without difficulty.

Regulation by States

Not only should the organizer of a bus line give careful consideration to the regulations of the State in which he will operate, prior to his application for a permit, but also at frequent periods thereafter. Bus transportation is comparatively new in the field of public utilities, and for that reason the laws and regulations applying to them have not yet become stabilized. New regulations are continually being supplemented for the old, which might affect the operator's type of equipment, schedules, routes, or fares charged. Consequently, the company should keep complete cost records and operating records, in order to be able to give to the local authorities at short notice a clear picture of operating conditions, so that equitable regulations can be devised from the actual operating experiences.

The Legal Requirements

In some states, companies operating as public utilities are required to incorporate their business under the laws of those states. In other states incorporation is not necessary. However, whether it is required or not, incorporating a business is good practice, especially in cases where, by the nature of its business, it is frequently apt to have claims brought against it for personal injury or damage to property. Incorporation of a company protects the owners and stockholders from any personal liability arising from such claims against the company. As the requirements for incorporating greatly differ in each state, it is suggested that the organizer of a company discuss this matter with his own lawyer or one who is familiar with the laws of the state in which operation is proposed.

On the following pages is a digest of the regulations, restrictions and taxes of motor bus operation in each individual state, appearing in alphabetical order. These facts and figures have been derived from literature compiled and published by the Motor Vehicle Conference Committee as of January 1, 1924. More detailed information may be obtained on written request to the committee at headquarters of the National Automobile Chamber of Commerce, 366 Madison Ave., New York City.

ALABAMA

Tax Commission. The commission has been vested with power of control over motor bus operation, within, out from, and into municipalities. The prospective operator is required to file with them a written statement describing the terminal points covered by the buses. This should be done after securing the approval of local municipal authorities within whose jurisdiction the buses are to operate. A special license is granted.

Size Restrictions. None.

Weight Restrictions. 20,000 lbs. gross.

Speed Restrictions. Reasonable and proper, having regard to width, traffic and use of the highway. Speed in excess of 30 miles per hour for a distance of a quarter mile prima facie evidence of a rate of speed that is not careful and prudent.

Taxes. In place of the usual state motor vehicle registration fee, buses will be taxed as follows:

	Annually
Seating capacity, 5 or less	$37.50
Seating capacity, 6 to 9	60.00
Seating capacity, 10 or more, operating between cities and towns 10 miles or more apart	60.00
Otherwise	90.00

Personal property tax in addition to the above fees.

ARIZONA

Corporation Commission. Controls motor bus operation, within, out from, and into municipalities. They require operators to carry an Indemnity Bond, as specifically conditioned by them. The commission has general powers in granting Certificates of Convenience and Necessity, regulating service, and fixing rates and fares. Operators should first secure the approval of municipal authorities within whose jurisdiction the buses will operate.

Size Restrictions. Width, 96 in. Height, 12 ft. 6 in. Length, 30 ft.

Weight Restrictions. 30,000 lbs. gross. Weight must be distributed not more than 700 lbs. per inch (base) width of tire.

Speed Restrictions. Reasonable and proper. In closely built up sections, 10 miles per hour; elsewhere in incorporated city or town, 15 miles per hour. Outside incorporated city or town, 30 miles per hour, 4 miles per hour on sharp curves, steep descents and similar dangerous places.

Taxes. None other than those applicable to all motor vehicles.

ARKANSAS

As yet no law regulating motor bus operation has been passed placing control in the hands of a state agency. To establish a bus line in this state the operator should communicate with the local governing bodies in the municipalities in which and through which the buses will operate. It may frequently be found that many municipal governments are exercising some degree of control over motor bus operation within their jurisdictions.

Size Restrictions. Width, 96 in. Height 12 ft. 6 in.

Weight Restrictions. 25,000 lbs. gross. Rear axle limit, ¾ of gross; ½ axle load on one wheel. A graduated scale of weight limits based on nominal tire widths is also prescribed.

Speed Restrictions. Passenger Cars:

Open country	30 miles per hour
Suburban	20 miles per hour
Urban	Varies in the different municipalities

Taxes. In addition to the regular registration and license fees, motor fuel taxes and personal property tax, all passenger carriers shall pay $2.50 for each passenger of carrying capacity. Minimum is $15 per annum.

CALIFORNIA

Railroad Commission. Exercises control over motor bus operation out from and into municipalities, issuing a Certificate of Public Convenience and Necessity. Its general powers are to grant, refuse, suspend, revoke or amend Certificates already granted. Prescribe service or extensions thereof. Fix rates and fares. Supervise fiscal affairs. Authorize sale or lease of Certificates of Public Convenience and Necessity.

Size Restrictions. Width, 96 in.; 102 in. maximum for common carriers on highways exceeding 15 feet in width.

Weight Restrictions. 24,000 lbs. gross on 4 wheels. Rubber tires, 700 lbs. inch (base) width of tire.

Speed Restrictions:

Open country	35 miles per hour
Business district	15 miles per hour
Residence district	20 miles per hour

Fifteen miles per hour around curves, at railroad crossings, intersections and passing schools, slower on bridges, dams, viaducts, etc. Vehicles whose gross weight is 16,000 lbs. or more, 20 miles per hour.

Taxes. In addition to motor fuel taxes and personal property tax:

Registration fees, flat rate, $3.00

Special Fees	Pneumatic Tires	Solids
Unladen—Less than 3000 lbs.	$5.00	$10.00
3000—5999 lbs.	10.00	20.00
6000—9999 lbs.	15.00	30.00
10,000 and over	20.00	40.00

Tax on Gross Receipts. Tax of 4 per cent on gross receipts less amounts paid as municipal fees and taxes.

COLORADO

Public Utilities Commission. Exercises control over all phases of bus operation, within, out from, and into municipalities. Approval should first be secured from the municipalities in which and through which the buses will operate. This commission issues Certificates of Public Convenience and Necessity, having wide control over their issuance. Its further powers are: Prescribe service or extensions thereof; fix rates and fares; promote health, safety and convenience of operation. Municipalities may purchase and operate motor vehicles as common carriers.

Size Restrictions. None.

Weight Restrictions. 16,000 lbs. load on 4 wheels.

Speed Restrictions. Maximum, 35 miles per hour; mountain roads, 20 miles per hour. Platted mountain curves, 12 miles per hour; other curves 18 miles per hour. In case gross weight of vehicle is more than 10,000 lbs., maximum speed, 20 miles per hour.

Taxes. In addition to the regular registration and license fees, motor fuel tax and personal property tax:

Special Registration Fees

Passenger carriers seating 9 passengers or less	$20.00
Each additional seat capacity..................	1.00

CONNECTICUT

Public Utilities Commission. Exercises control over motor bus operation, within, out from, and into municipalities; issues Certificates of Public Convenience and Utility. Street railways are exempted from this requirement. It also requires bus operators to carry Indemnity Insurance based on the seating capacity, ranging from

$5000 to $10,000 per vehicle. It has the power to grant or deny Certificates of Public Utility. Street railway companies may acquire, own and operate motor vehicles for hire. Railroads may operate buses on their tracks.

Size Restrictions. Width, 102 in.

Weight Restrictions. 25,000 lbs. gross, not less than 20 per cent on one axle; 800 lbs. per inch (base) width of tire. Weight limits per wheel running from 500 lbs. for 3 inch tire to 6500 lbs. for 10 inch tire, are also prescribed.

Speed Restrictions. Commercial vehicles with solid tires, 15 miles per hour; with pneumatic tires, 20 miles per hour; crossing bridges with solid tires, 8 miles per hour.

Taxes. In addition to the regular registration and license fees, motor fuel tax and personal property tax:

Public Service Registration

Seating capacity of 7 or less	$15.00
Additional—Each seat, 8 to 20 persons	2.00
Additional—Each seat, 21 to 40 persons	5.00
Additional—Each seat over 40 persons	10.00

Jitney Registration

Slightly higher fees based upon passenger capacity.

DELAWARE

This state, at their 1923 session of Legislature, granted to the city of Wilmington the powers to designate the streets over which motor buses may operate, and to determine the number of licenses to be granted for such operation. To establish a bus route in this state, the operator should get in touch with the municipal authorities in the city controlling motor bus operation.

Size Restrictions. Width, 96 in. Height, 12 feet, 2 inches.

Weight Restrictions. 22,000 lbs. gross. On one axle, 16,000 lbs. 700 lbs. per inch width of tire. Point of measurement not fixed.

Speed Restrictions. No vehicle whose gross weight is over 6000 lbs. shall operate at a speed in excess of 30 miles per hour.

Pneumatic tires (maximum speed)

Gross Wt. vehicle and load lbs.	Open country Miles	Suburban Miles
6000	35	15
8000	25	15
12,000	25	15
16,000	25	15
20,000	22	12
22,000	20	12

Thickly settled districts, same speed as suburban.

Solid tires (maximum speed)

Gross wt. of vehicle and load lbs.	Open country Miles	Suburban Miles	Thickly Settled dist. Miles
6000	25	15	15
8000	20	15	12
12,000	18	15	12
16,000	16	15	12
22,000	15	15	12

Taxes. None other than those applicable to all motor vehicles in the state.

FLORIDA

As yet no law has been passed that places the regulation of motor buses under the control of a state agency. Prospective operators should apply to local authorities in the municipalities in which or through which the buses will operate.

Size Restrictions. Width, 84 inches. Height, 12 feet.

Weight Restrictions. Municipalities have their own individual restrictions.

Speed Restrictions

State highways	30 miles per hour
Incorporated cities	15 miles per hour

At railroad crossings, curves, intersections, etc., 15 miles per hour. Passenger vehicles carrying more than 7 persons shall not operate faster than 25 miles per hour.

Taxes. In addition to the regular registration and license fees, motor fuel taxes and personal property taxes:

Special Registration Fees

Passenger carriers per passenger without driver.

7 or less	$5.00	plus 75c.
8 to 16	7.50	per 100 lbs.
17 or more	10.00	gross weight

Between passenger depots and hotels $5.00 per passenger of seating capacity plus 50c. per 100 lbs. gross weight.

GEORGIA

Public Service Commission. Holds that it has jurisdiction over motor vehicle common carriers, which applies to motor bus operation. In this instance, their powers are very similar to those outlined at the beginning of this chapter under the heading State Regulation. Prospective operators should first ascertain to what degree the individual municipalities regulate bus operations within their jurisdiction before filing applications with the state agency.

Size Restrictions. None.

Weight Restrictions. Individual regulations by cities and incorporated towns.

Speed Restrictions. No person shall operate a motor vehicle *at a speed greater* than is reasonable and safe, not to exceed 30 miles per hour. At railroad crossings, curves, intersections, deep descents, etc., 15 miles per hour.

Taxes. In addition to the regular registration and license fees, motor fuel taxes and personal property taxes.

Special Registration Fees for

Passenger carrying vehicle with a seating capacity of 10 or more	$75.00

IDAHO

To date no state law has been passed regulating motor bus operation through a state agency. Prospective operators should communicate with the municipal governments within whose jurisdiction the buses are to operate, obtaining the exact status of their respective regulatory powers over buses.

Size Restrictions. None.

Weight Restrictions. 500 lbs. per inch width of tires for tires over 2 inches in width. Point of measurement, in pneumatic tires between flanges of rim; on solid tires, the base. Minimum thickness of rubber tires, 3/4 in. Commission of Public works may limit weight of loads when in their judgment the roads would be damaged by use of loads of maximum weight limits allowed.

Speed Restrictions. Open country, 30 miles per hour. In cities and towns, 20 miles per hour. At intersections and school houses, 12 miles per hour.

Taxes. In addition to motor fuel taxes, but instead of the regular registration fees when carrying capacity exceeds 7, which is classified as a truck and its gross weight is taxed on a truck basis, passengers being averaged at 175 lbs. each. In addition $3 per passenger of carrying capacity.

ILLINOIS

Commerce Commission. Exercises control over motor buses operating within, out from, and into municipalities. They require a Certificate of Public Convenience and Necessity; adequate Indemnity Insurance or sworn statement of ability to meet any possible damage claims. This commission has the powers to grant, refuse, alter, modify Certificates of Public Convenience and Necessity. Regulate rates, fares, service, contracts, practices, etc.

Size Restrictions. Width, 96 in.

Weight Restrictions. 24,000 lbs. gross weight. On one axle, 16,000 lbs. 800 lbs. per inch width of tire. Point of measurement not fixed. At seasons of the year when frost is leaving the ground, highway officials having proper jurisdiction may prohibit operation of vehicles having a gross weight of over 5000 lbs. Embargo must not exceed 45 days in any one year.

Speed Restrictions. Vehicles carrying not more than 7 passengers:

Open country	35 miles per hour
Sparsely built up section in town or city	20 miles per hour
Residence Section	15 miles per hour
Business	10 miles per hour
Around corners	8 miles per hour

Vehicles carrying more than 7 passengers, gross weight, 5000 to 12,000 lbs.; with pneumatic tires, carrying passengers, 25 miles per hour.

Taxes. In addition to the regular registration fees and personal property taxes:

Passenger Carriers

A fee of $1 per 100 lbs. gross weight; passengers computed at 125 lbs. each.

INDIANA

As yet there is no state law regulating motor bus operation. Prospective operators should get in touch with the authorities of municipalities in which and through which the buses are to operate, in respect to their respective regulations.

Size Restrictions. None.

Weight Restrictions. 24,000 lbs. gross. On one axle, 19,500 lbs. 800 lbs. per inch of width of tire, measured between flanges of the rim. Highway commission has the power to prescribe maximum weights at certain seasons of the year in order to prevent injury to the highways. County commissioners have the same power to prevent injury to the county highways.

Speed Restrictions:

Business section of incorporated cities and towns	10 miles per hour
Residence section	15 miles per hour
Sparsely built up	20 miles per hour
Open country	25 miles per hour

Taxes. Passenger carriers on regular schedules of time and rates, not operating exclusively within municipal limits, must pay in addition to the regular registration and license fees, motor fuel tax and personal property tax, a fee of $3 per person of rated carrying capacity.

IOWA

Board of Railroad Commissioners. Exercises control of buses operating out from, and into municipalities, operation within the municipal limits being governed by the authorities of each individual municipality. For bus operation on other than urban routes the operator must apply to the board for a Certificate of Authorization. Operators are required to carry Liability Insurance Bond in a form approved by the Commission. Amount to be fixed by board. Also Bond to insure payment of fees. This commission has powers to grant, or repeal Certificates; prescribe rules and regulations of operation, supervise accounts, and fix rates and charges. Requires monthly report of ton miles operated. Prescribes safety rules.

Size Restrictions. Width, 96 in.

Weight Restrictions. 28,000 lbs. gross. On one wheel, 8000 lbs.

Per Inch Width of Tire

800 lbs. on hard surface road.
400 lbs. on earth, gravel and similar surfaces.
Point of measurement of tire is at the base.

Common Carrier Maximum Weight

Pneumatic tires	20,000 lbs. gross
Solid tires	16,000 lbs. gross

Speed Restrictions:

Gross Weight	Solids *Miles per hour*	Pneumatics *Miles per hour*
Less than 3 tons	25	30
3 to 6 tons	20	25
6 tons or over	12	16

Cities and towns may establish speed limits within their limits.

KANSAS

Kansas at present has no law regulating motor bus operation. Those proposing to start operations in this state should first ascertain to what degree the municipal authorities exercise control over buses operating within their respective jurisdiction.

Size Restrictions. None.

Weight Restrictions. None.

Speed Restrictions. Open country, 40 miles per hour; within city or village, 12 miles per hour; at railroad crossings, intersections, turning curves, 8 miles per hour; when crossing or intersection is in city or village, 6 miles per hour; cities of 1st, 2nd and 3rd class shall have power to regulate speed within their limits.

Taxes. None other than those applicable to all motor vehicles.

KENTUCKY

This state, in a recent session of Legislature, passed a law placing the control of motor buses in the hands of the State Highway Commission, who regulates their operations out from, and into municipalities; leaving the control of urban bus operation to the municipal authorities. The general powers of this commission are similar to the nine phases outlined at the beginning of this chapter.

Size Restrictions. None.

Weight Restrictions. 800 lbs. per inch width of rubber tire. Point of measurement, surface contact.

December 15th to April 1st.

Per inch tire width	Gross weight on solid rubber tires
Less than 3 inches	5,500 lbs.
3 less than 4	6,500 lbs.
4 less than 5	7,500 lbs.
5 or more	10,000 lbs.

On brick, concrete and similar heavy construction, 50 per cent greater load allowed. County judges may issue permits for operation within limits of their counties of vehicles subject to the Dec. 15th to April 1st restrictions.

Speed Restrictions. Reasonable and proper at all times. Open country, 30 miles per hour. Residence districts, 20 miles per hour. Business and closely built districts, 15 miles per hour.

Taxes. None other than those applicable to all motor vehicles.

LOUISIANA

As yet no regulatory law has been passed in respect to motor bus operation. Prospective operators should ascertain to what degree, if any, the municipal authorities exercise control within their respective corporate limits, before starting operations.

Size Restrictions. Body width, 84 in.

Weight Restrictions. 15,000 lbs. gross on rear axle. No more than 10 per cent in excess of rated capacity allowed. 600 lbs. per inch (base) width of rubber tire. State Highway Commission may grant written permits for operation of wider or heavier vehicles. May also permit putting on of wider tires.

Speed Restrictions:

Open country	35 miles per hour
Cities	15 miles per hour
In incorporated towns and when chauffeur's view is obstructed...	10 miles per hour

Taxes. In addition to motor fuel taxes and personal property tax.

Special Registration Fee

Passengers carriers—68 cents per Horse Power plus $2.00 per passenger up to 8; $3.00 per passenger from 8 to 25; $5.00 per passenger over 25.

MAINE

Public Utilities Commission. Exercises control over motor bus operation within, out from, and into municipalities. They require the operator to obtain a Certificate of Permission. The general powers of this agency is to make rules and regulations governing operation; fix rates; regulate routes and schedules, etc. Revoke Certificates.

Size Restrictions. Width, 96 in. Height, 12 ft., 6 in.

Weight Restrictions. 18,000 lbs. gross on 4 wheels; (50 per cent more on 6 wheels) distributed not more than 13,500 lbs. per axle nor more than 700 lbs. per inch (base) width of tire. If weight distribution is not more than 600 lbs. per inch (base) width of tire, nor more than 16,000 lbs. per axle; gross weight may be 20,000 for 4 wheels.

Speed Restrictions:

Commercial Vehicles

Open country	20 miles per hour
Within city and town	12 miles per hour
Equipped with two or more solid tires:	
Open country	15 miles per hour
Within cities and towns	10 miles per hour
At intersections, crossings and curves	8 miles per hour

Taxes. In addition to the regular registration and license fees, motor fuel taxes and personal property tax:

Special Registration Fee

100 per cent over normal fee.

MARYLAND

Public Service Commission. Exercises control of motor bus operation within, out from, and into municipalities, requiring from the operators an Annual Permit. Their powers are to grant or refuse permits; make rules and regulations governing operation; fix rates, fares, schedules, etc.; provide for safety and convenience of the traveling public.

Size Restrictions. Width, 90 in.

Weight Restrictions. 20,000 lbs. gross. 600 lbs. per inch width of tire. Point of measurement not fixed.

Speed Restrictions:

Open country	25 miles per hour
Thickly settled sections	15 miles per hour
Not thickly settled	20 miles per hour

Taxes. In addition to personal property and motor fuel taxes, the following registration fees for passenger carriers:

Class A.—Weighing 3000 lbs. or less $1/20$ cent times seating capacity per mile.

Class B.—3000 lbs. to 7000 lbs. $1/15$ cent times seating capacity per mile.

Class C.—Over 7000 lbs., $1/5$ cent times seating capacity per mile.

MASSACHUSETTS

Department of Public Utilities. This state agency exercises final authority only in case of appeal from authority vested in local governing bodies. Therefore, to establish bus operation in this state the prospective operator must apply to the municipal authorities within whose jurisdiction the buses are to operate.

Size Restrictions. Width, 96 in. Length, 28 ft.

Weight Restrictions. 28,000 lbs. gross. 800 lbs. per inch width of tire. Point of measurement not fixed.

Speed Restrictions. Reasonable and proper speed at all times. The prima facie speeds are as follows:

On city crossings and corners	8 miles per hour
Along city streets	15 miles per hour
Open country	20 miles per hour

Taxes. Special license to be obtained from local authorities in addition to registration with the state authorities.

MICHIGAN

Public Utilities Commission. Exercises control of bus operations within, out from, and into municipalities. On granting of application to operate, a Certificate of Public Convenience and Necessity is issued to the operator. The commission has powers to prescribe rules and regulations governing operation; grant or refuse certificates; fix routes, rates, etc.

Size Restrictions. Width, 96 in. Length, 12 ft. 6 in. Length, 40 ft.

Weight Restrictions. 38,000 lbs. gross. On one axle, 18,000 lbs. 700 lbs. to each inch width of tire, measuring according to manufacturer's list.

Speed Restrictions:

Open country	35 miles per hour
Business sections of incorporated city and village	15 miles per hour
In other sections	20 miles per hour

Taxes. In addition to the regular registration and license fees:

Special Fee

$1.00 for each 100 lbs. weight of each vehicle employed as a carrier.

MINNESOTA

At present this state has no law placing motor bus regulation under the jurisdiction of a state agency, consequently, the prospective operator should ascertain, before establishing a bus line, what regulations each individual municipal government exercise over bus operation within their respective jurisdictions.

Size Restrictions. Width, 96 in. Length, 12 ft. 6 in. Length, 30 ft.

Weight Restrictions. 28,000 lbs. gross. On one axle, 22,400 lbs. 800 lbs. per inch (base) width of tire.

Speed Restrictions:

Open country, reasonable and proper, not to exceed	25 miles per hour
Residential sections	15 miles per hour
Congested sections	10 miles per hour
Curves	6 miles per hour

Taxes. In addition to wheelage taxes which may be levied by local governments, 10 per cent of value with minimum fees as follows for passenger carriers:

5 passengers to 15	$250.00
Over 15 passengers	350.00

MISSISSIPPI

As there is no state law regulating motor bus operation, the prospective operator should make application for permission to operate to the municipal authorities within whose jurisdiction the buses are to operate. From them the operator can secure complete information pertaining to bus regulations of each individual community in which he proposes to operate.

Size Restrictions. None.

Weight Restrictions. None.

Speed Restrictions. Reasonable and proper speed at all times.

Open country	30 miles per hour
Residence district	15 miles per hour
Closely built up	15 miles per hour
Approaching bridges, curves, intersections, etc.	10 miles per hour

Taxes. None other than those applicable to all motor vehicles.

MISSOURI

No state regulations as yet passed placing motor bus operation under the control of a state agency. Consequently, to establish bus operation the organizer should secure permission or approval of the local authorities in the municipalities in which the buses are to operate. Local regulations should be studied carefully before starting operations.

Size Restrictions. Width, 108 in. Height, 15 ft. Length, 30 ft.

Weight Restrictions. 28,000 lbs. gross on 4 wheels. 800 lbs. per inch of tire width measured at the base.

Speed Restrictions. Speed limit depends on the speed established by each municipality. State law provides for speed which is reasonable and proper, with the following maximums:

For passenger cars	25 miles per hour

Taxes. None other than those applicable to all motor vehicles.

MONTANA

Railroad Commission. Exercise control of motor bus operation out from and into municipalities, urban routes being left entirely to the discretion and regulation of municipal authorities. The operator proposing to establish a route, other than strictly urban, should make application to this state agency for a Certificate of Permission. For urban or city routes, the operator applies to the municipal authorities only. In every instance the operator is required to carry Indemnity Bonds or Insurance in such penal sum as the commission may deem necessary. The commission supervises operations; prescribes fares and charges. Examines reports and statements. Examines facilities and regulates service and safety of operation.

Size Restrictions. None.

Weight Restrictions. None.

Speed Restrictions. No greater speed than is reasonable under the conditions existing at the point of operation. Cities and towns, by ordinance may regulate speed and traffic upon streets within the incorporated limits.

Taxes. In addition to the regular registration and license fees, motor fuel taxes and personal property taxes:

Special Fees

In accordance with size and weight, not to exceed $10.00 per vehicle.

NEBRASKA

Railroad Commission. Has jurisdiction over motor bus operation out from and into municipalities. Urban or city bus routes are left entirely in the control of the municipal authorities. To operate buses outside municipal limits requires that application be filed with the state agency for permission.

Size Restrictions. Width, 90 in. Height, 12 ft.

Weight Restrictions. On one wheel, 7000 lbs.; 600 lbs. per inch of tire width. Point of measurement not fixed.

Speed Restrictions. Open country, 35 miles per hour. In suburban and urban districts no greater speed than is reasonable and proper having regard to traffic use, condition of road, etc.

Taxes. None other than those applicable to all motor vehicles.

NEVADA

Boards of County Commissioners. In this state the county commissioners have jurisdiction over motor bus operation, whether operated within, through or across counties. The organizer must apply to them for a Certificate of Public Convenience and Necessity, and at the same time, secure the approval of the municipal authorities within whose jurisdiction the buses are to operate. The operator is required to carry an Indemnity Bond of not less than $500 nor more than $10,000 per vehicle. The commissioners general powers are to issue or withhold Certificate of Public Convenience and Necessity; regulate fares, rates, schedules, classifications; examine books and records; prescribe service; order improvements, additions, etc.

Size Restrictions. None.

Weight Restrictions. 25,000 lbs. gross on 4 wheels; 600 lbs. per inch (base) width of tire.

Speed Restrictions. Not to be operated at greater speed than is reasonable and proper, having regard to traffic and use of highways.

Taxes. Fees according to a classification based upon the kind and character of public highways upon which the vehicle operates as fixed by the various Boards of County Commissioners.

NEW HAMPSHIRE

Public Service Commission. Exercise control of motor bus operation within, out from and into municipalities. After securing approval of the municipal authorities in which or through which the buses are to operate, the prospective operator must file application with the state agency for a permit to operate. The operator is also required to carry a Bond amounting to $500 per vehicle plus $100 per person of seating capacity. The general powers of this state agency is to grant or refuse permits; establish reasonable rules and regulations governing operation of motor buses.

Size Restrictions. Width, 96 in. Length, 30 ft.

Weight Restrictions. 20,000 lbs. gross weight on 4 wheels. On one axle, 15,000 lbs. Per inch (base) width of tire, 750 lbs.

Speed Restrictions. No greater speed than is reasonable and proper.

Open country	25 miles per hour
Thickly settled or business district.	15 miles per hour
Suburban	15 miles per hour
Around curves, at intersections, etc.	10 miles per hour

Local governments have the right to fix speed also.

Taxes. None other than those applicable to all motor vehicles, except that local authorities may fix special license fees.

NEW JERSEY

Board of Public Utility Commissioners. Exercises control over motor bus operation within, out from and into municipalities, in conjunction with the approval of municipal authorities. However, the Board has sole control when the buses parallel street railways. This is only applicable on lines established after March 15, 1921, but if established before said date and ownership changes after such date, the new owner is subject to the Board's jurisdiction. Operators are required to carry Indemnity Bonds of $5000 by municipalities in which they operate.

The Board has general supervision over rates, fares, schedules, service, etc.

Size Restrictions. Width, 96 in. Height, 12 ft., 6 in. Length, 28 ft.

Weight Restrictions. 30,000 lbs. gross. 800 lbs. per inch (base) width of tire. Specific limits are prescribed for various sizes of tires and wheel diameters.

Speed Restrictions:

Open country	30 miles per hour
In built up portions of towns and cities	12 miles per hour
At intersections in open country	15 miles per hour
At sharp curves and corners	8 miles per hour
On passing horses or other animals	15 miles per hour

Taxes. In addition to the regular registration and license fees and personal property tax—special registration fees as follows:

5 passengers or less	$15.00
6– 8 passengers	17.50
9–12 passengers	20.00
13–17 passengers	25.00
18–22 passengers	30.00
23–26 passengers	35.00
27–30 passengers	40.00

Over thirty passengers, $40.00 plus $3.00 per seat in excess of 30.

NEW MEXICO

No regulatory law has yet been enacted affecting motor bus operation in this state. The organizer of a bus line should secure the approval of the local authorities of municipalities in which or through which the buses are to operate, and be guided by their respective regulations.

Size Restrictions. Width, 96 in.

Weight Restrictions. 12,000 lbs. load. Per inch width of tire, 700 lbs. Point of measurement not fixed.

Speed Restrictions. Motor vehicles shall be operated in a careful and prudent manner.

Passenger Vehicles

Open country	35 miles per hour
Business section	15 miles per hour
Over bridges	20 miles per hour
Past school houses	10 miles per hour
Past other vehicles	15 miles per hour

Taxes. In addition to motor fuel tax and personal property tax—if equipped with pneumatic tires, $25 plus 75 cents for each 100 lbs. of weight carrying capacity. Twenty-five per cent extra if equipped with any solid tires.

NEW YORK

Public Service Commission. In this state the prospective operator must first secure the consent of municipal authorities within whose jurisdiction the buses are to operate, before applying to this commission for a Certificate of Public Convenience and Necessity. The carrying of Indemnity Bonds as conditioned by the local authorities is required of the operator. The Commission has control over buses operating within, out from and into municipalities. It has general jurisdiction over rates, fares, schedules, services, etc.

Size Restrictions. Width, 96 in. (Outside of New York City.)

Weight Restrictions. 28,000 lbs. gross. 700 lbs. per inch of tire (base) width. (Outside of New York City.)

SPEED RESTRICTIONS. Open country, 30 miles per hour.

Motor trucks, 2 tons or under.	20 miles per hour
Motor trucks, over 2 tons.....	15 miles per hour
Trucks with pneumatic tires..	5 miles per hr. extra

Cities of 1st and 2nd class may regulate speeds. Other cities and towns may limit speed to 15 miles per hour.

TAXES. In addition to the regular registration and license fees special registration fees as follows:

5 passengers or less........................	$15.00
6– 7 passengers	24.50
8–10 passengers	30.50
11–16 passengers	43.00
17–20 passengers	52.00
21–22 passengers	55.00
23–26 passengers	61.50
27–30 passengers	67.50

Plus $2 per passenger over 30. Schedule not applicable to omnibuses operating wholly within municipalities under franchise granted by said municipalities.

NORTH CAROLINA

As there has been no law passed in this state regulating motor bus operation, the organizer of a line should secure approval from the authorities of the municipalities in which or through which the buses are to operate.

SIZE RESTRICTIONS. Width, 96 in.

WEIGHT RESTRICTIONS. 11,000 lbs. capacity limit on State Highway System.

SPEED RESTRICTIONS:

Open country	30 miles per hour
Residence sections	20 miles per hour
Business	10 miles per hour
On wooden or steel bridges.......	10 miles per hour

Taxes. In addition to the regular registration and license fees, motor fuel taxes and personal property tax:

Extra Fee

Fifty per cent over normal rates for passenger carriers.

NORTH DAKOTA

Board of Railroad Commissioners. Exercises control over motor bus operation out from and into municipalities. The prospective operator should first secure permission from local authorities of municipalities in which or through which the buses are to operate, before applying to the Board for a Certificate of Public Convenience and Necessity. Strictly urban bus routes come under the complete jurisdiction of municipal authorities. The bus owner is required by law to carry Liability and Property Damage Insurance. The minimum liability on bond is $5000 for personal injury; and $1000 for property damage. The Board has the power to grant or refuse certificates; fix and adjust rates, fares, charges, classifications, rules and regulations, etc.

Size Restrictions. None.

Weight Restrictions. None.

Speed Restrictions. At no greater speed than is reasonable and proper.

Open country	30 miles per hour
In incorporated cities and villages.	10 miles per hour

Taxes. In addition to the regular registration and license fees, motor fuel tax and personal property tax—

Passenger Carriers

Minimum fee of $10.00.

Over 8 passengers, 50 cents per passenger extra.

OHIO

Public Utility Commission. The prospective operator must apply to this Commission for a Certificate of

Public Convenience and Necessity, after securing permission from local authorities of municipalities in which or through which the buses are to operate. The Commission regulates bus operation within, out from and into municipalities, and has the power to grant or refuse certificates. It also has power to fix reasonable rates, fares, charges, schedules, etc. Requires reports and uniform accounting systems. Certificates of Public Convenience and Necessity are not transferable, conveyable or assignable.

SIZE RESTRICTIONS. Width, 96 in. Height, 12 ft. 6 in. Length, 30 ft.

WEIGHT RESTRICTIONS. 20,000 lbs. gross. On one axle, 16,000 lbs. per inch width of tire, solid and pneumatic, 6 in. or over, 650 lbs.; measured between flanges of rim. The weight per inch decreases in proportion to the size of tire under 6 in. in width.

SPEED RESTRICTIONS:

	Commercial Cars		
	Open country M.P.H.	Sub-urban M.P.H.	Closely built up M.P.H.
3 tons not over 6 tons..	25	20	15
Over 6 tons...........	20	18	12
Solid tires			
Up to 4 tons..........	20	15	12
Over 4 tons...........	15	15	12

TAXES. In addition to the personal property tax, the following:

Registration Fees

Passenger Carriers operating between:

	Fixed Points	Not Fixed Points
7 passengers or less..................	$40.00	$20.00
More than 7 passengers or less than 12.	90.00	50.00
More than 12 passengers or less than 18.	140.00	90.00
More than 18 passengers or less than 24.	180.00	115.00
24	240.00	150.00

OKLAHOMA

Corporation Commission. The prospective operator is required to apply to this commission for a Certificate of Public Convenience and Necessity only in cases where buses are to operate out from and into municipalities. To operate within municipal limits it is only necessary to secure permission from the local authorities. The Commission requires operators to carry Indemnity Bond as conditioned by it. It has general supervision, regulation and jurisdiction in matters of rates, fares, schedules, service, etc.

Size Restrictions. Width, 90 in.

Weight Restrictions. 20,000 lbs. gross. On one axle, 16,000 lbs. Per inch width of tire, 800 lbs. Point of measurement not given.

Speed Restrictions:

Passenger cars:
Open country .... 35 miles per hour

Taxes. In addition to the regular registration fees and motor fuel taxes:

Special Fees

⅕ cent per mile. Mileage determined on basis of number of trips scheduled per day and computed on a basis of 30 days per calendar month regardless of whether vehicle carries out its schedule.

OREGON

Public Service Commission. To establish a strictly urban or city bus line, the organizer need only apply to the municipal authorities for a permit to operate. For buses to operate out from and into municipalities, an application must be filed with this state agency for a Certificate, setting forth special terms and conditions under which operation is permitted. The operator is also required to carry an Indemnity Bond as conditioned by the commission. It has supervisory and regulatory powers in all matters affecting the relationship of carriers with passengers; to fix reasonable rates, fares, charges, service facilities, etc. Supervise and regulate accounts, require reports, data, etc.

Size Restrictions. Width, 96 in.

Weight Restrictions. Gross weight, 22,000 lbs. distributed not more than 17,000 lbs. per axle, nor more than 500 lbs. per inch (contact) width of tire for total of less than 30 in. on 4 wheels; 600 lbs. for total tire width of 30 or more inches on 4 wheels. If total concentrated weight on highway is 6500 lbs. or less, tires must be at least 1 in. thick; over 6500 lbs. to 11,000, 1¼ in.; over 11,000, 1½ in.

Speed Restrictions. Passenger cars equipped with pneumatic tires:

Total tire width	*Speed*
Not over 28 inches	30 miles per hour
Over 28 inches	20 miles per hour

Taxes. In addition to the regular registration and license fees and motor fuel tax:

Extra Registration Fees

Passenger Carriers—$4.00 per passenger allowing 20 inches of seating capacity per passenger.

PENNSYLVANIA

Public Service Commission. After taking up the matter of establishing a bus route with the local authorities within whose jurisdiction the buses are to operate, and on securing their approval, the prospective operator is required to file application with the state agency for a Certificate of Public Convenience and Necessity. This Commission exercises control over buses operating within, out from and into municipalities, and has powers to grant or refuse Certificates of Public Convenience and Necessity. It also has power to regulate fares, rates, schedules, equipment, service, etc.; to examine accounts and records; reports, uniform accounting methods, etc., are required of the operator.

Size Restrictions. Width, 90 in. In cities of 1st, 2nd and 3rd class, width of 96 in. is permitted. Height, 13 ft. Length, 30 ft.

Weight Restrictions. 26,000 lbs. gross weight, distributed not more than 19,500 lbs. per axle, nor more than 800 lbs. per inch (point of measurement not fixed) width of tire. Moreover, vehicles are classified (AA—F) and gross weight limits prescribed for each class. 7000 lbs. for AA class to 26,000 lbs. for F class.

Speed Restrictions:

Commercial Motor Vehicles

Gross weight	*Speed per hour*	
	Pneumatics	Solids
5,000 lbs.	26 miles	24 miles
7,000 lbs.	24 miles	20 miles
11,000 lbs.	24 miles	20 miles
13,000 lbs.	22 miles	18 miles
18,000 lbs.	19 miles	15 miles
22,000 lbs	19 miles	15 miles
25,000 lbs.	16 miles	12 miles
26,000 lbs.	14 miles	10 miles

Taxes. Motor Omnibus (including taxicabs, etc.)

Seating Capacity	*Solid Tires*	*Pneumatic Tires*
5 or less	$25.00	$20.00
6 to 26	2.50 each add. seat	2.00 each add. seat
27 and over	6.25 each add. seat	5.00 each add. seat

Fees for solid tired vehicles with seating capacity in excess of 53 persons shall not exceed $250.00.

RHODE ISLAND

Public Service Commission. Exercises control of motor bus operation within, out from and into municipalities. After securing approval of local authorities application must be filed with this state agency for a Certificate of Public Convenience and Necessity. The commission has powers to grant, revoke, amend Certificates of Public Convenience and Necessity; prescribe reasonable rules and regulations regarding routes, fares, speed, continuity of service and the convenience and safety of passengers and the public. Street railways may acquire, own and operate motor vehicles for hire.

Size Restrictions. Width, 102 in. Height, 12 ft. 6 in.

Weight Restrictions. 28,000 lbs. gross. On one axle 22,000 lbs., rubber tires. On one wheel, 800 lbs. (rubber tires) per inch. Point of measurement between the flanges of the rim.

Speed Restrictions:

Truck Speed Limits

	Pneumatics Miles	Solids Miles
4000 lbs. or less	25	25
Over 4000 to 6000	25	20
Over 6000 to 13,500 lbs.	25	20
Over 13,500 lbs.	20	15

Taxes. In addition to the regular registration and license fees and personal taxes:

Extra Registration Fees

100 per cent over normal fees.

SOUTH CAROLINA

As there is no law yet passed that would place motor bus operation within control of a state agency, the prospective operator should ascertain the extent of regulation exercised by the municipal authorities and be guided accordingly in the matter of applying for permission to operate.

Size Restrictions. Width, 90 in.

Weight Restrictions. 8000 lbs. capacity.

Speed Restrictions. Reasonable and proper at all times and places, having regard to the traffic and use of highways, etc. Maximum speed, 25 miles per hour. At intersections, bridges, curves, steep descents, etc., 6 miles per hour. Slower if necessary when passing horses or other draft animals.

Taxes. None other than those applicable to other motor vehicles.

SOUTH DAKOTA

Board of Railroad Commissioners. This commission exercises control over motor bus operation insofar as such operation is out from and into municipalities. Urban or city bus routes are left to the complete jurisdiction of the municipal authorities. For routes extending beyond municipal limits, the prospective operator must apply to the commission for a Certificate of Authority. The operator is required to carry a Bond in penal sum of not less than $3000 nor more than $50,000, to cover personal liability and property damage. The commission has powers to grant or revoke Certificates; also to supervise and regulate operations; make safety rules and regulations; operate uniform system of accounts, receive and examine quarterly reports.

Size Restrictions. None.

Weight Restrictions. 10,000 lbs. capacity.

Speed Restrictions. Operate vehicle in careful and prudent manner. Over 25 miles per hour shall be presumptive evidence that speed is not careful and prudent. Local authorities have power to regulate speed within limits of municipalities to not less than 15 miles per hour.

Taxes. In addition to the motor fuel tax and personal property tax:

Special Tax

25 per cent of gross earnings.

TENNESSEE

Railroad and Public Utilities Commission. Although this commission holds that it has jurisdiction over motor buses as common carriers, it has not as yet had occasion to exercise this power. Consequently it will only be necessary to secure the right to operate buses by making application to authorities of the municipalities in which or through which the buses are to operate.

Size Restrictions. None.

Weight Restrictions. 20,000 lbs. gross weight. 650 lbs. per inch (base) width of tire.

Speed Restrictions. Maximum speed, 20 miles per hour. Municipalities have authority to prescribe lower maximum speed within corporate limits of not less than 10 miles per hour, and a maximum speed of lower than 12 miles per hour may be prescribed by any municipality to govern street, intersection and curves.

Taxes. In addition to the regular registration fees and motor fuel taxes:

Special Fees for Passenger Carriers

2 passenger capacity..........	$2.00
5 passenger capacity..........	10.00
7 passenger capacity..........	14.00

Over 7 passenger capacity, $2.00 for each extra passenger.

TEXAS

As there has been no state regulatory law passed in regard to state control of motor bus operation, the organizer should first ascertain what regulations are being exercised by the local authorities, and be guided accordingly in filing application with them for permission to operate within their individual jurisdictions.

SIZE RESTRICTIONS. Width, 90 in.

WEIGHT RESTRICTIONS. Not more than 6000 lbs. gross weight on any one wheel, nor more than 650 lbs. per inch of tire width. (Point of measurement not fixed.) Solid rubber tires must be at least one inch thick. No motor vehicle shall operate upon highways with a load 10 per cent in excess of its registered carrying capacity.

SPEED RESTRICTIONS:

Gross Weight Lbs.	*Speed per hour* Miles
2,000 to 4,000	18
4,000 to 8,000	15
8,000 to 12,000	12
12,000 to 16,000	12
16,000 to 20,000	10

Equipped with solid rubber tires

2,000 to 4,000	16
4,000 to 8,000	14
8,000 to 16,000	12
16,000 to 22,000	10

TAXES. In addition to the regular registration and license fees and personal property tax and motor fuel tax.

Extra Registration Fee

Passenger carriers shall pay $4.00 for each passenger the motor vehicle will seat.

UTAH

PUBLIC UTILITIES COMMISSION. Has the jurisdiction over motor bus operation within, out from and into municipalities. The prospective operator, on securing the approval of the local authorities, must apply to the Commission for a Certificate of Public Convenience and Necessity. This state agency has powers to supervise and regulate all bus operation; fix rates, fares, tolls, rentals, charges, classifications; regulate practices, facilities and methods; establish uniform accounting systems, make investigations, require reports, etc.

Size Restrictions. Width, 96 in.

Weight Restrictions. 20,000 lbs. gross. On one wheel, 7500 lbs. Per inch width of tire, 600 lbs. on hard surface highways; 400 lbs. on sand or gravel, measured between flanges of the rim.

Speed Restrictions:

	Tires	
	Pneumatic	Solid
Gross weight	Miles per hour	Miles per hour
6000 lbs. or less	30	20
Over 3 tons to 4 tons	25	15
Over 4 tons	16	8

Taxes. None other than those applicable to all other motor vehicles.

VERMONT

Public Service Commission. Exercises control over motor bus operation within, out from and into municipalities. Application for permit to operate should be made to this state agency. The operator is required to carry an Indemnity Bond of $500 per vehicle plus $100 per person of seating capacity. The commission has general supervision and jurisdiction with privilege to grant or refuse permits; establish reasonable rules and regulations.

Size Restrictions. Width, 96 in. Height, 12 ft. 2 in.

Weight Restrictions. 12,500 lbs. gross in towns and incorporated municipalities, 10,000 lbs. elsewhere. 600 lbs. per inch (contact) width of tire.

Speed Restrictions. Open country, 25 miles per hour. Urban, 10 miles per hour. Crossing bridges, 10 miles per hour.

Taxes. No other state levies than those applicable to all other motor vehicles. Subject to local and municipal license fees.

VIRGINIA

State Corporation Commission. Prospective operators are required to file applications for Certificates of Public Convenience and Necessity with this commission in order to secure the right to operate motor buses, whether within, out from or into municipalities. Those applicants whose assets, over and above liabilities, are less than $10,000 may be required by the commission to carry bond or surety in such amount as it may determine, to insure against personal injury and property damage. In addition to its powers to grant, revoke or amend Certificates of Convenience and Necessity, it has general powers to regulate and supervise bus operations.

Size Restrictions. Width, 96 in. Height, 12 ft. 6 in. Length, 30 ft.

Weight Restrictions. Weight of load not to exceed 10,000 lbs. Per inch of tire width, 700 lbs. on Class A road; 600 lbs. on Class B road, and 500 lbs. on Class C road. Point of measurement contact with road.

Speed Restrictions:

Open country	30 miles per hour
Passenger cars (more than 7)....	20 miles per hour
Residence section of cities and villages	15 miles per hour
Congested districts	10 miles per hour
Speed on passing another vehicle..	20 miles per hour
At crossings, intersections, bridges, curves, etc.	15 miles per hour

Taxes. In addition to personal property tax and motor fuel tax.

Special Fees—(In lieu of all other registration fees).

Passenger Carrying Vehicles. Class A.—Less than 3000 lbs. charged $\frac{1}{50}$ cent per passenger seat times total number of miles traveled. Class B.—Over 3000 lbs. and less than 7000 lbs. if equipped with solid tires, or 8500 lbs. if equipped with pneumatic tires, shall pay $\frac{1}{40}$ cent per passenger seat times the total number of miles traveled. Class C.—Over 7000 lbs. if equipped with solid tires, or 8500 lbs. if equipped with pneumatic tires, shall pay $\frac{1}{20}$ cent per passenger seat times the total number of miles traveled.

WASHINGTON

Department of Public Works. The prospective operator planning to establish bus operation out from or into municipalities must file application with this state agency for a Certificate of Public Convenience and Necessity. This should be done only after securing the approval of the local authorities. To establish a strictly urban or city bus route, it is only necessary to obtain permission from the municipal authorities. In the case of out-of-town bus lines, the operator is required by the state agency to carry an Indemnity Bond of $5000 to $10,000 per vehicle for injury to persons, on 12 passenger vehicle; $20,000 on a 20 or more passenger vehicle. Not over $1000 for property damage. This state department has the powers to grant, refuse, suspend, revoke, alter Certificate of Necessity; fix rates, fares, charges, classifications, regulations; prescribe equipment and service of operation; regulate accounts, require reports, etc. Any incorporated city or town may operate common carriers in conjunction with street railway systems.

Size Restrictions. Width, 96 in.

Weight Restrictions. 24,000 lbs. gross. On one axle, 18,500 lbs. Per inch (base) width of tire, 800 lbs.

Speed Restrictions. Operate vehicles in a careful and prudent manner.

Open country	30 miles per hour
Incorporated limits	20 miles per hour
Street intersections, past schools, etc.	12 miles per hour
Trucks with pneumatic tires	25 miles per hour

Taxes. In addition to personal property tax and motor fuel tax:

Registration Fees. $20.00 ($25.00 in case of auto stages) for first 1500 lbs. weight; 60 cents per 100 lbs. in excess of 1500 lbs.; plus $3.00 per passenger of carrying capacity.

Franchise and Special Fees. Sufficient to pay costs of supervision and regulation, not to exceed 1 per cent of gross operating revenue, fixed by Director of Public Works; paid quarterly.

WEST VIRGINIA

State Road Commission. The organizer of a bus line in this state is required to file application with this commission for a Permit or Certificate of Convenience to operate, whether such operation be within, out from or into municipalities. The operator is also required to carry a Bond in such sum as the Commission deems adequate to compensate for injury to persons and loss or damage to property. The commission not only has powers to grant Certificates of Convenience but also to make rules and regulations for the operation of buses; prescribe routes, schedules, fares, etc.; demand reports and information.

Size Restrictions. Width, 90 in. Height, 12 ft. Length, 40 ft.

Weight Restrictions. 20,000 lbs. gross. On one axle, 17,000 lbs. 900 lbs. on any one wheel. 600 lbs. per inch width of tire (surface contact).

Speed Restrictions:

	Speed per hour		
Gross weight	Open country	Suburban	Urban
Passenger cars more than 7 pass., wt. 6000 lbs.	35	25	15
On other vehicles, same wt., pneu. tires	25	20	15
Equipped with solid tires, less than 4000 lbs.	15	10	10

Taxes. In addition to personal property tax:

Registration Fees

Passenger Carriers over Regular Routes. Less than 3000 lbs., pay $\frac{1}{20}$ cent for each passenger seat times total number of miles. Over 3000 lbs. but less than 7000 lbs., pay $\frac{1}{15}$ cent per passenger seat times total number of miles. Over 7000 lbs., pay $\frac{1}{10}$ cent per passenger seat times total number of miles.

WISCONSIN

Railroad Commission. Prospective operators, after receiving consent of municipalities that are to be affected by the proposed bus lines, are required to file application for permits to operate with this commission, whether such operations be within, out from or into municipalities. Operators are required to carry Indemnity Bonds as fixed and approved by the Commission. It determines routes, fares and service. District attorney is authorized to enforce rules laid down by the Commission.

Size Restrictions. Width, 96 in. Length, 30 ft.

Weight Restrictions. 24,000 lbs. gross on class A highway; 15,000 lbs. on class B highway. Distributed not more than 18,000 lbs. per axle, nor more than 800 lbs. per inch width of tire (point of measurement not fixed).

Speed Restrictions. Open country, 30 miles per hour; within incorporated city or village, 15 miles per hour; where building more than 200 ft. apart, 20 miles per hour; through cemeteries, passing schools, hospitals, etc., 12 miles per hour; around curves, reasonable speed.

Trucks

More than 3 tons, less than 6, pneu. tires	20 miles per hour
With two or more solid tires	16 miles per hour
More than 6 tons with pneu. tires	16 miles per hour
With solid tires	12 miles per hour

Taxes. In addition to personal property tax, the following:

Registration Fees

Each passenger carrier having a carrying capacity of more than 5 persons, gross weight of 1½ tons or less	$30.00
More than 1½ tons up to 2¼ tons	45.00
2¼ tons up to 3 tons	60.00
3 tons up to 4 tons	90.00
4 tons up to 5 tons	135.00
5 tons or more	135.00

Plus $5.00 for each ¼ ton or fraction in excess of 5 tons.

The gross weight determined by adding together the weight in pounds of the vehicle when equipped to carry passengers and the total passenger weight capacity in pounds divided by 2000. The total passenger weight shall be determined by dividing the total length of seating space, including driver's seat, by twenty inches times 150.

WYOMING

Public Service Commission. There is no special act applying to motor vehicle common carriers, but the attorney general has ruled that the Public Service Commission has jurisdiction over this class of utility under the Public Utilities Act. Consequently, the prospective operator is required to file application with this Commission for a Certificate of Convenience and Necessity, should the proposed operation be within, out from or into municipalities. The Commission has powers to regulate and supervise; act as arbitrators; examine any public utility; order books produced; investigate; make complaints; change rates and all necessary incidental powers.

SIZE RESTRICTIONS. None.

WEIGHT RESTRICTIONS. 25,000 lbs. gross.

SPEED RESTRICTIONS. Operate vehicle at a reasonable and proper speed having regard for other traffic and intended use and condition of road. Reduce speed to a reasonable rate at intersections, bridges, curves, descents, and on passing other vehicles or animals. Municipal authorities may not regulate speed within municipalities below 20 miles per hour unless at intersections or in congested sections.

TAXES. None other than those applicable to all motor vehicles.

DISTRICT OF COLUMBIA

PUBLIC UTILITIES COMMISSION. Organizers of bus lines are required to secure the approval of this commission before beginning operations within the District. The Commission has general regulatory powers such as described at the beginning of this chapter under the heading, "State Regulation."

SIZE RESTRICTIONS. Width, 90 in.

WEIGHT RESTRICTIONS. 30,000 lbs. on streets, roads and bridges; 12,000 lbs. on any bridge with wooden floor.

SPEED RESTRICTIONS:

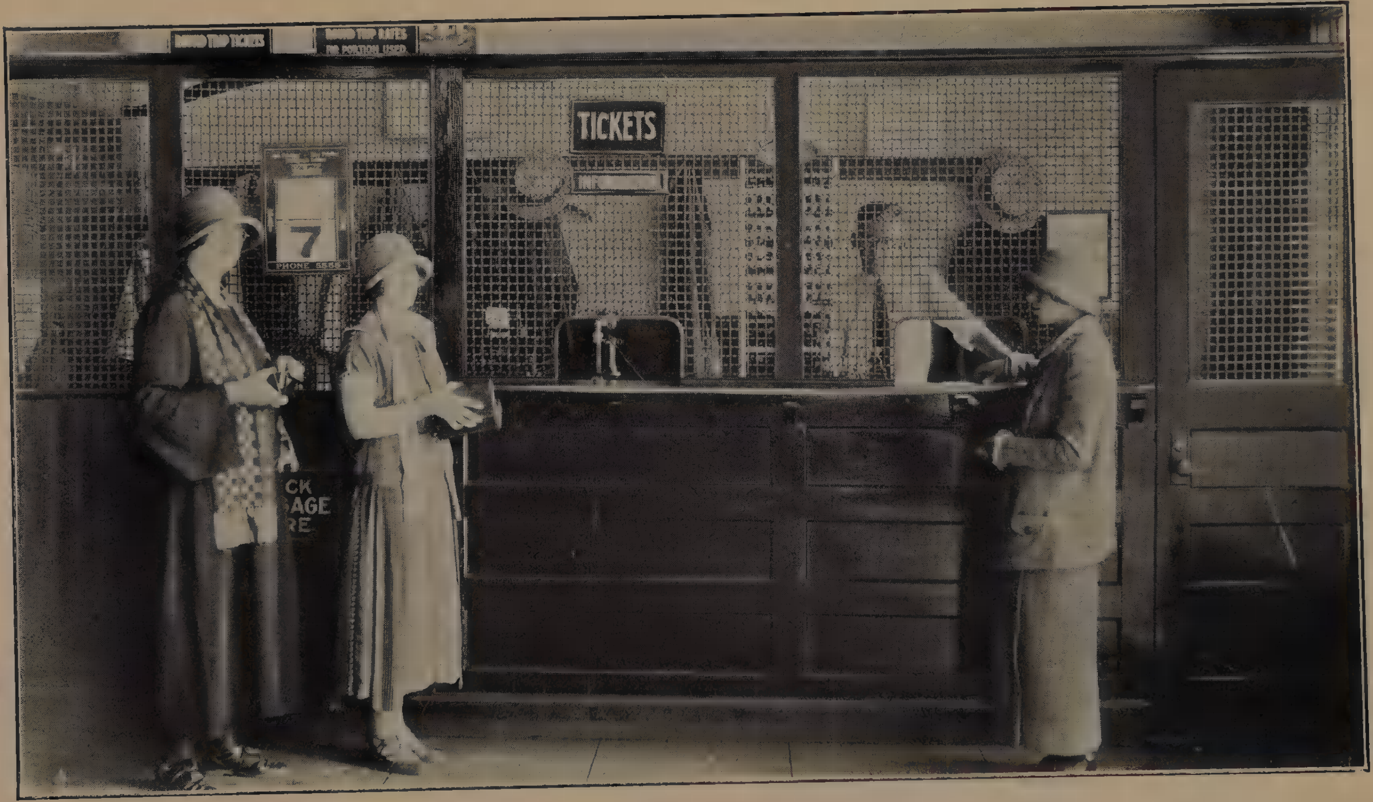
One Ton or More in Weight

Any highway	12 miles per hour
Intersections, crossings, past schools	8 miles per hour
Bridges with wooden floors.......	8 miles per hour
Across Highway Bridge over Potomac River	12 miles per hour

TAXES. $9 for each vehicle up to 10 passenger seating capacity; $12 for each vehicle with seating capacity greater than 10. In addition to personal property tax and regular registration fees.

A PRIVATE ROOM SUCH AS SHOWN IN THIS ILLUSTRATION MAKES A DIRECT APPEAL TO THE FEMININE RIDERS.

THE ATTRACTIVE MANNER IN WHICH THESE GOODS ARE DISPLAYED ADDS MUCH TO THE VALUE OF THE CONCESSIONS WHICH HELP TO SUPPORT THIS WAITING-ROOM.



AN ARRANGEMENT WHICH LEAVES NO DOUBT IN THE PATRON'S MIND AS TO WHERE INFORMATION CAN BE OBTAINED AND WHERE TICKETS MUST BE PURCHASED.

CHAPTER IV

Passenger Terminals and Waiting Rooms

THE interurban bus line with no home is just as much a vagrant as the unfortunate who incurs the displeasure of the local constable. It is psychologically impossible to build up a paying clientele unless the public can be made to realize that the bus line is just as much a part of local commerce as the bank or the post office.

A railroad without depots is unthinkable, and it is for this reason more than anything else that the word "Jitney" has become a term of derision.

The two things which establish a bus line in the minds of the people are, when the buses leave, and from where. It has been pointed out that adherence to schedule is absolutely mandatory if the line is to instill confidence.

Terminals Becoming Part of Bus Lines

While many riders will wait on street corners for public conveyances, by far the majority prefer to start their journeys from waiting rooms. Bus operator after bus operator has seen the handwriting on the wall with the result that throughout all parts of the country bus terminals and waiting rooms are becoming as much a part of the lines as the vehicles themselves. The majority of those entering the bus transportation field do not realize the importance of having suitable terminal facilities and many who do realize the importance of this step consider it impossible to finance a regular terminal. This is a mistaken idea as a terminal does not necessarily involve a heavy investment.

Even the proprietor of the small country store is beginning to realize the importance of bus transportation and a canvass of such stores in the towns through which a bus line is to run will in most cases result in a waiting room entirely without cost to the bus operator.

The proprietors of such stores know that bus riders are potential purchasers of their goods and in many cases will be willing to set aside some space in their store which can be used as a waiting room for bus patrons. This space will of course be supplemented by curb space in front of the store reserved for the arrival and departure of buses. It might be argued that such space would be well enough for small communities located at intermediate points on the route but would not do for main terminals located, as they generally are, in towns of considerable size. In support of this argument it might be said that the space which the average store could spare would be entirely inadequate if there are many passengers arriving and departing.

Terminals Can Be Made Self-supporting

This is true in many cases, for well established bus lines require waiting rooms of considerable size at their two major terminals, but even if no merchant can be found willing to devote a portion of his store to be used as a waiting room, terminal space can be obtained which will cost a bus operator practically nothing. Even though the rent asked for a suitable room appears to be prohibitive he can turn an apparent liability into an asset by the judicious disposal of concessions. In most instances concession space is in great demand and can always be disposed of without undue effort. One of the most profitable sources of income within a terminal is from the advertising space on the walls.

The cost to the operator is practically nothing, as the cost of putting up suitable racks on the walls for advertising cards and signs is of little consequence. Every merchant and hotel in a terminal city is a prospective buyer of this advertising space.

In approaching such people a point should be made of the number of people who will daily pass through or wait in the terminal depot and any progressive business man will immediately see the benefits to be derived from this form of advertising. Jewelers have always profited by the free installation of a clock mounted on the wall of the waiting room. Bus schedules and clocks are so closely linked together that practically every patron of the line will immediately glance at the clock on entering the waiting room, and will at the same time unconsciously absorb the simple advertisement printed on the clock.

It should be kept in mind that those spaces which have not been sold should not be left blank. Such blank spaces are not only unsightly but reflect on the other advertisers. This space can be used to good advantage by the operator himself. Pictures and advertising matter of the line itself, while not a source of direct revenue, will pay for themselves by aiding materially in further selling of bus transportation to the public.

Newspaper distributors find bus terminals a very profitable field, and the newspaper and periodical concessions in such terminals often bring large returns.

The size of the waiting room has a very material effect on the number and character of the concessions which can be solicited. In many instances a terminal contains candy shops, cigar stores, restaurants, barber shops, etc. But, such terminals occupy considerable space and to lease a large building with the idea of afterwards obtaining contracts with such concessionaires would be foolhardy. If however, some of the above concessions could be sold in advance together with contracts obtained from the proprietors of soda fountains, fruit stands, shoeshine parlors, haberdashers and so on, the operator would be warranted in leasing space large enough to accommodate them all, as by so doing it would not only pay the rent for his terminal, but the very size of the institution would constitute a potent source of advertising.

Telephone booths, vending and weighing machines also add to the operator's revenue as well as the renting of parcel checking privileges.

Location Very Important

The elaborateness of a bus terminal depends on the volume of traffic and on the number of concessions which can be successfully disposed of, but regardless of size and completeness there are certain principles which should guide the bus operator in establishing his terminal. In the first place the location should be right. A terminal located in the shopping center is much to be preferred to one located in a garage on a side street. The bus operator should bear in mind that he must merchandise his service, which certainly involves making the service convenient and attractive to its patrons, particularly to women.

It is not often found that the garage in which buses are stored and serviced makes a good terminal as such garages are usually located off the main thoroughfare and are not often of a high order as regards cleanliness. If possible, terminals should be located at points which permit the buses to leave the town without being forced to run through congested thoroughfares for any length of time.

The importance of this measure has caused one bus line in particular to locate its terminal on the outskirts of a city, depending on the local trolley service to bring its patrons to the terminal. In establishing this terminal it was considered that the absence of traffic delay more than overcame the loss in revenue which might result from routing buses through a territory which was far removed from the shopping center. While this is an isolated case and not to be recommended for general practice, it does prove to some operators that, at least, the location of the terminal is secondary in importance to rapid running time.

The motor bus field is still in a primary stage of development and undoubtedly the future growth will be rapid and extensive. However, there is no way by which the direction of a growth can be accurately predicted.

In view of the uncertainty as to the future trend of the business, long term leases on terminal premises are not advocated. A terminal established today may be entirely inadequate both as to size and location in a comparatively short time.

Some Cities Have Many Small Terminals

A bus line operator having the field to himself in a city or town of even medium size is fast becoming a rarity. It will be found that in most instances a number of independent bus lines will radiate from a common center. In the past, such lines have had their terminals at independent points and lack of cooperation has curbed much of the usefulness of the lines, owing to the fact that it has been impossible for patrons to learn where the bus line to a certain town makes its starting place, when it departs, arrives, etc. Many of these lines have had their terminal in some small hotel, arrangements having been made with the hotel employees to give information as to the routes, schedules, fares, etc.

As to be expected, such loose arrangements are very unsatisfactory; nevertheless independent operators of this kind have succeeded in establishing business which has brought many residents of small outlying towns and farmers to the city more frequently than had been their custom, because the buses made the trip an easy one. Merchants throughout the country have been quick to see the value of motor buses as a means of bringing rural people into the city to shop. It has not been difficult for them to appreciate the advantages of having as many as several hundred people a day brought in by buses to the immediate vicinity of their stores.

These merchants have been instrumental in the establishment of Union Terminals in many of the cities and have cooperated with the operators of the independent bus lines to such an extent that the Union Terminal is fast supplanting the small terminal waiting rooms of the individual bus operator.

These Union Terminals have much in common, differing each from the other only as to size, elaborateness, methods of financing, etc.

Like the terminal of the independent operator these Union Terminals to a great extent depend on the revenue from concessions. It will be seen therefore that the step from the small one line terminal to the Union Terminal is not a great one and undoubtedly in the immediate future many of the present terminals will become the centers of bus lines radiating in every direction.

One Terminal Connects with Restaurant

The Bus terminal in Poughkeepsie, New York, is operated by the local Chamber of Commerce. It is located in a new building put up expressly for this purpose. The terminal is equipped with a soda water fountain and candy counter which is operated by the owner of the restaurant next door to the terminal. In fact, the two buildings adjoin so that the restaurant can be reached by passing through a connecting doorway. In return for the soda fountain and candy concession the restaurant maintains the terminal completely, the rent expense being shared by the Chamber of Commerce and the bus owners.

The terminal is comprised of a waiting room, parcel checking space, and rest rooms. The terminal is open daily from 8 A.M. to 11 P.M. Its purpose, according to the Chamber of Commerce, is to afford the greatest possible benefit, efficient service and comfort to bus patrons. Smoking is not permitted in the waiting room and bus operators and their drivers are not permitted to occupy the premises to the exclusion or discomfort of public patrons.

In order to inform the public about the operation of the different lines a bulletin board is provided inside the waiting room where notices are posted concerning running time, rates and special announcements as to extra trips, arrivals and departures. The location of the terminal is almost ideal for its purpose. It is situated on a private street but immediately in the rear of the chief hotel of the city.

Kansas City Terminal Has Easy Exit

The location of the Union Bus Depot in Kansas City, Missouri, is also ideal. In addition to the advantage of being in a locality which is the popular center of the city, it also has an easy exit to the open country. Much running time is thus saved as it is not necessary for the vehicles to pass through the heavily congested section of Kansas City.

The equipment and furnishings of the station measure up, in every way, to the standard of a high class bus service. A retiring room is reserved for the convenience of ladies and every effort is made to keep the surroundings as pleasant as possible.

Matron an Innovation

An average of 3000 people a day pass through the bus terminal located at Portland, Oregon.

There are approximately 153 scheduled bus departures per day, distributed among the 14 bus operating companies. One of the innovations in this terminal is the employment of a matron whose duties are to render any possible service to the ladies and to see that no loafers or undesirables frequent the terminal. The presence of the matron has made it possible for mothers to have their daughters met at the depot and in many ways serves to show that the bus companies are catering to the best class of patrons, and plan their service accordingly.

By an arrangement with the Y.W.C.A. one half of the matron's salary is paid by that organization and one half by the terminal company. Concessionaires who rent space in the depot include a cash-and-carry grocery store, a confectionary and lunch counter, news stand, parcel checking booth, barber shop, etc. The rate of rental for this space is about 30 cents per square foot per month and the demand is greater than the available space. Doubtless, with increased use of the terminal, this will eventually increase to an even higher figure.

Merchants Own Terminal Company

A small amount of stock in the terminal company is owned by merchants and hotels located nearby, but the controlling interest is held by the bus operators themselves. In addition to the 10 per cent dividends paid by the terminal company they have been able to set aside a sinking fund with which to start financing the construction of a new and larger depot at some later date.

Other Union Terminals

The City of Rome, New York, is in the center of a rich farming district from which daily flows a stream of business visitors who come to shop in the city stores. Recognizing the value of encouraging these visits the merchants of Rome decided that they would provide a bus terminal where all of the lines could receive and discharge passengers and where the patrons could wait amid pleasant surroundings.

The people of Rome learned somewhat in advance of some other cities the drawbacks of having bus lines load and unload passengers in the streets of the city or at different points. The Rome Union Bus Terminal was established and is maintained by the City Chamber of Commerce. It came into being in 1921 and is located in one of the street stores of the Hotel Stanwix Hall. It serves as a terminal for six bus companies. There is a general waiting room, 25 x 75 feet with tiled floor equipped with easy chairs and a buffet where cigars, periodicals, ice-cream, and soft drinks are served. The ladies' retiring room has wicker furniture and is kept clean and neat at all times. There is an entrance to the hotel lobby in the rear. On the pavement in front of the entrance space has been marked off for five buses, the loading and unloading being done at the curb. The terminal costs the bus operators nothing. All the expenses are paid by the Chamber of Commerce which collects individual subscriptions from the city's merchants. A salary is paid to the terminal superintendent but he supplements this salary with profits from the concessions covering the sale of cigars, magazines and newspapers.

Union Terminal at Omaha, Neb.

Seven motor bus operators with lines radiating in eight directions out of Omaha, Nebraska, got together during the summer of 1921, mainly through the influence of certain Omaha merchants, in an endeavor to get cooperation between the various competing lines.

Eighteen merchants entered into the proposition and underwrote the $200 a month rent which, incidentally, the landlord was induced to reduce from $300 a month because of the increased rental value brought to the adjoining stores in the building by virtue of the number of people that were brought to this point daily. The location of this terminal is particularly favorable from every standpoint. The 36 x 80 foot space within the station is divided into a general waiting room, a ladies' rest room, and a smoking room, all suitably furnished and equipped by assessment on the association members. To care for current expenses each member pays $2.00 a month dues which go into the legislative fund, and a monthly service charge of $15.00 per bus in advance for the use of the station.

Since the depot was placed in service this fee has been more than sufficient to cover the cost to the association for heat, light, janitor service, agent, and miscellaneous expense in conducting the station.

The operators are enthusiastic about the joint terminal as it enables them at small expense to have a definite bus center where patrons can get information about buses and find comfort while waiting for them. It has also been the means of increasing the volume of business very materially.

The candy, cigars, and miscellaneous sales concessions are granted by the association on a basis of 12½ per cent of the gross sales, minus $7.00 a week which the association pays towards the salary of the clerk who also acts as ticket agent and information clerk.

A free checking service is provided and also operated in conjunction with some of the merchants. Purchasers can direct the store to deliver packages to the bus depot in time for a certain bus, and on so doing are issued check stubs with which to claim their property at the depot.

A porter who besides doing the janitor work presides over the shoe shine stand, calls departure of buses, and assists passengers with baggage, etc.

Any additional expense which may arise on the operation of the Union Depot will be prorated among the various members according to the number of buses they operate. It is also agreed that any work done by one member for another shall be paid for on the basis of cost plus 10 per cent. Buses exchanged among operators to take care of emergency runs are paid for at the rate of 15 cents a mile if the borrower furnishes gas, oil and driver, or 22 cents a mile if these are furnished by the owner. A limited amount of purchasing is also done by the association on a joint basis for all of the bus lines. In this way a worthwhile saving is effected through quantity purchase. Aside from these joint relations each operator conducts his own business as an individual proposition.

Minneapolis Terminal Sets High Standard

In size, appointments and facilities, the new Minneapolis Union Bus Terminal exceeds the standards which even the most enthusiastic bus company would have considered necessary or practicable two or three years ago. Some idea of the magnitude of the undertaking, which in its first few months of operation is showing evidence of being a greater success than was anticipated by its most optimistic promoters, may be obtained from the fact that the total operating cost of the new station is estimated will run to about $50,000 a year.

Located at the intersection of Seventh Street and First Avenue, North, in the heart of the business district of the city, the station is convenient to hotels, retail stores and the wholesale district. Previous experience with a smaller terminal had shown that with an increasing number of bus movements per day and a large number of passengers arriving and departing, it was imperative to provide facilities for taking these buses off the busy streets when loading and unloading. Consequently, the new station comprises a large bus shed and a concourse leading from the waiting room through numbered gates to five loading platforms, sufficiently large to handle eighteen buses simultaneously.

Prior to April, 1922, the different intercity lines operating out of Minneapolis used various hotels and other points scattered about the city as terminals. In the spring of that year, the several lines got together and decided that the advantages of a union terminal would warrant the expense of such an undertaking. A small station was opened at 29 North Seventh Street. These quarters, however, were quickly outgrown and steps were taken to provide larger facilities. This culminated in the new Union Bus Terminal, which was opened to the public on June 1, 1924.

From the moment the traveler enters the door of the new station until he is comfortably seated in the proper bus, he gets an impression of a high-grade, well-organized, competently-managed and efficient service. The building consists of a one-story structure in which the station company occupies a space 125 ft. x 165 ft., giving a floor area of approximately 31,250 sq. ft. Of this space, 7500 sq. ft. is devoted to the waiting room including concessions, and the remainder is given over to the movement and loading of buses within the station building. Passenger entrances are located on Seventh Street and on First Avenue. The vehicle entrance to the bus shed and loading platforms is on the First Avenue side of the building.

The arrangement of the waiting room is designed to provide convenient and comfortable facilities for the traveler. The ticket office for clerks is divided by partitions from the waiting room and is equipped with grilled windows which give it an official business-like appearance. A comfortably furnished rest room for women opens off at one corner of the main waiting room, and a colored maid is in attendance. An information bureau in the main waiting room is provided with trained clerks on hand to serve the traveler, distribute time tables, and proffer advice and suggestions regarding bus schedules and routes.

In a balcony reached by an open stairway from the main waiting room are located the station manager's office and the telephone switchboard. The switchboard was put in this location in order to segregate the operators so that calls could be answered with a minimum of interruption. All telephone inquiries for information are answered here as far as possible, and when the operators are unable to supply the desired information directly, the inquiry is either switched to the information desk or to the employee who will be able to supply it. Direct lines connect with the garage of some of the companies operating out of the terminal, so that calls for extra equipment, or any other operating matters that require uninterrupted communication between the individual companies and the station, may be handled with dispatch. During an average rush hour incoming telephone calls are received at the rate of eighty per hour. There are also public telephone booths in the station for the convenience of travelers.

From the Seventh Street entrance, a wide lobby leads into the waiting room. Space for three shops inside the station open into this lobby. At the present time one of these is occupied by a five-chair barber shop, and the travelers keep it exceedingly busy. A candy store and a French pastry shop are located in other rooms.

The concessions include a restaurant, cigar and newsstand, and a soda fountain. In the bus shed a concession has been arranged with the Red Top Cab Company. This concession has proved very desirable as the loads are distributed more or less uniformly during the day. This makes the cab business from the station even more attractive in some respects than steam railroad station business because buses arrive and depart at frequent intervals during the day, whereas the steam railroad passenger train service brings heavy loads at comparatively infrequent intervals. An appreciation of the volume of business available from the terminal may be obtained from the fact that one peak hour, about 8 P.M., has developed as many as twenty-three loads of taxi passengers.

On the basis of results from only a short period of operation, it is conservatively estimated that the returns from concessions will equal the total rent of the station. Only the highest type of concessionaire has been selected, and extreme care has been exercised in making these arrangements in order to assure the highest possible grade of service to travelers. The restaurant concession is made on a percentage basis, and the rental for other concessions is determined on the basis of the estimated total passenger movement.

The terminal is opened at 6 A.M. and closed at 1 A.M. the following morning. During this period there is an average of more than 350 bus movements. During the two days of July 3 and 4, for the twenty-four hours from noon to noon, records show that 7000 passengers were loaded on buses at the station. This is in addition to the passengers handled by local buses operating between Minneapolis and St. Paul which do not come into the station, but handle passengers directly from the sidewalk in front of the building. Many of these local passengers use the waiting room, and patronize the concessions. An approximation of the number of people who come into, or in front of, the building may be obtained from the fact that these local buses operate on a five-minute headway between 7 A.M. and 7 P.M. and on a seven-minute headway from 7 P.M. to midnight.

A ten-year lease was taken on the property and the cost of remodeling the building to serve as a bus depot was paid by the terminal company. This amounted to approximately $40,000. The monthly rental is $1500 and the salaries of station employees and other incidental operating expenses added to this makes the total operating expenses approximately $50,000 per year.

Under a contract between the stockholders no member can hold a greater fraction of the total securities of the station than that corresponding to the total number of stockholders. The terminal company also is given the option of buying at any time the stock of any member company that desires to sell. The total cost of operating the station is prorated among the member lines on the basis of the number of buses operated.

One bus company, operating between St. Paul and Minneapolis, collects a cash fare on its buses and does not load passengers inside the station. This company pays a fixed amount per bus operated, which is considerably less than that paid by the inter-city lines whose tickets are sold in the station and whose buses load inside.

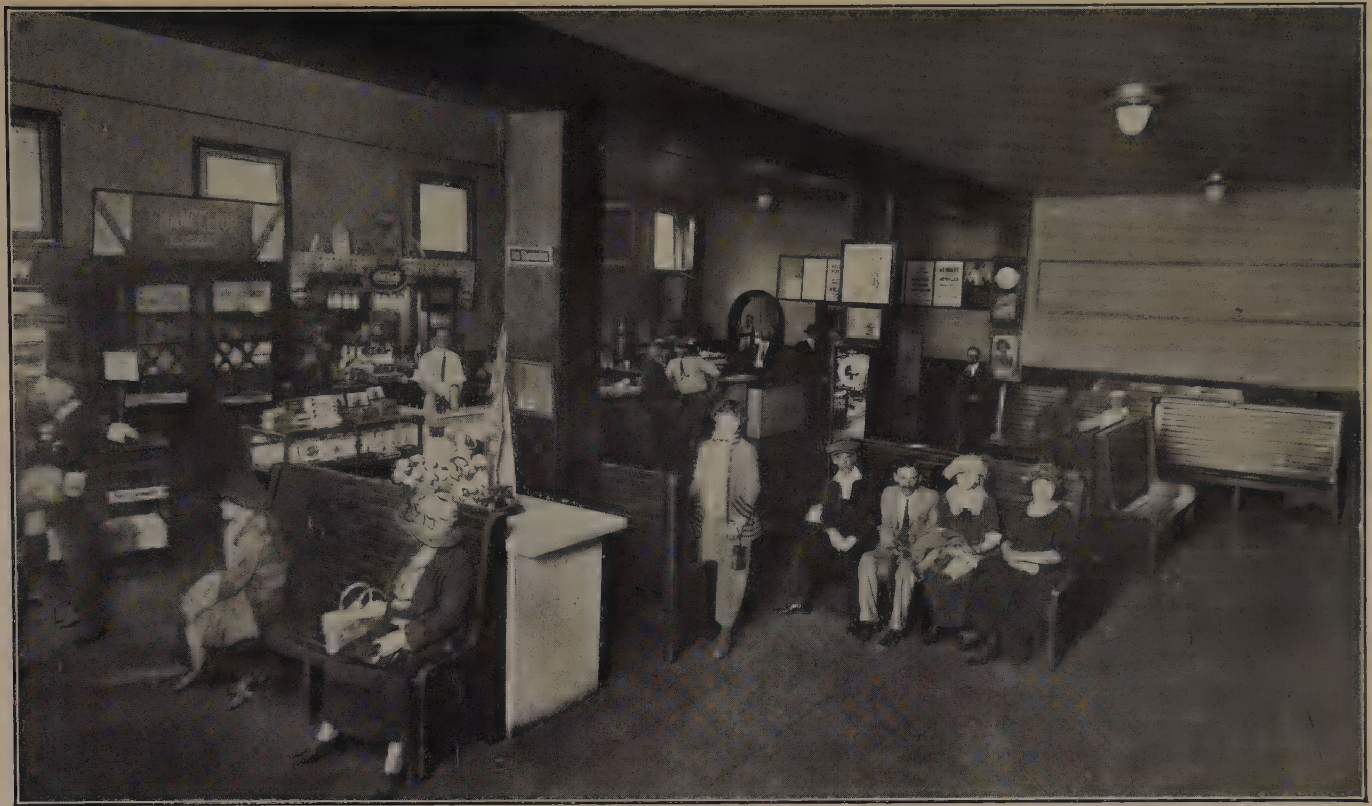
A total of twenty-two employees are required for the operation of the station. These employees include the following: One manager and one treasurer, who are both officers and serve without pay; two bookkeepers, three information clerks; three checkroom employees, two janitors, one colored maid attendant for the ladies' rest room, two bus callers, two telephone operators, two traffic managers who handle all the movements of buses within the station, and three cashiers or ticket clerks.

The checkroom is located at the entrance of the waiting room convenient to the concourse leading to the various loading gates, and is operated by the station company. During the first two months of operation, this parcel and baggage checkroom handled an average of 2000 pieces per month.

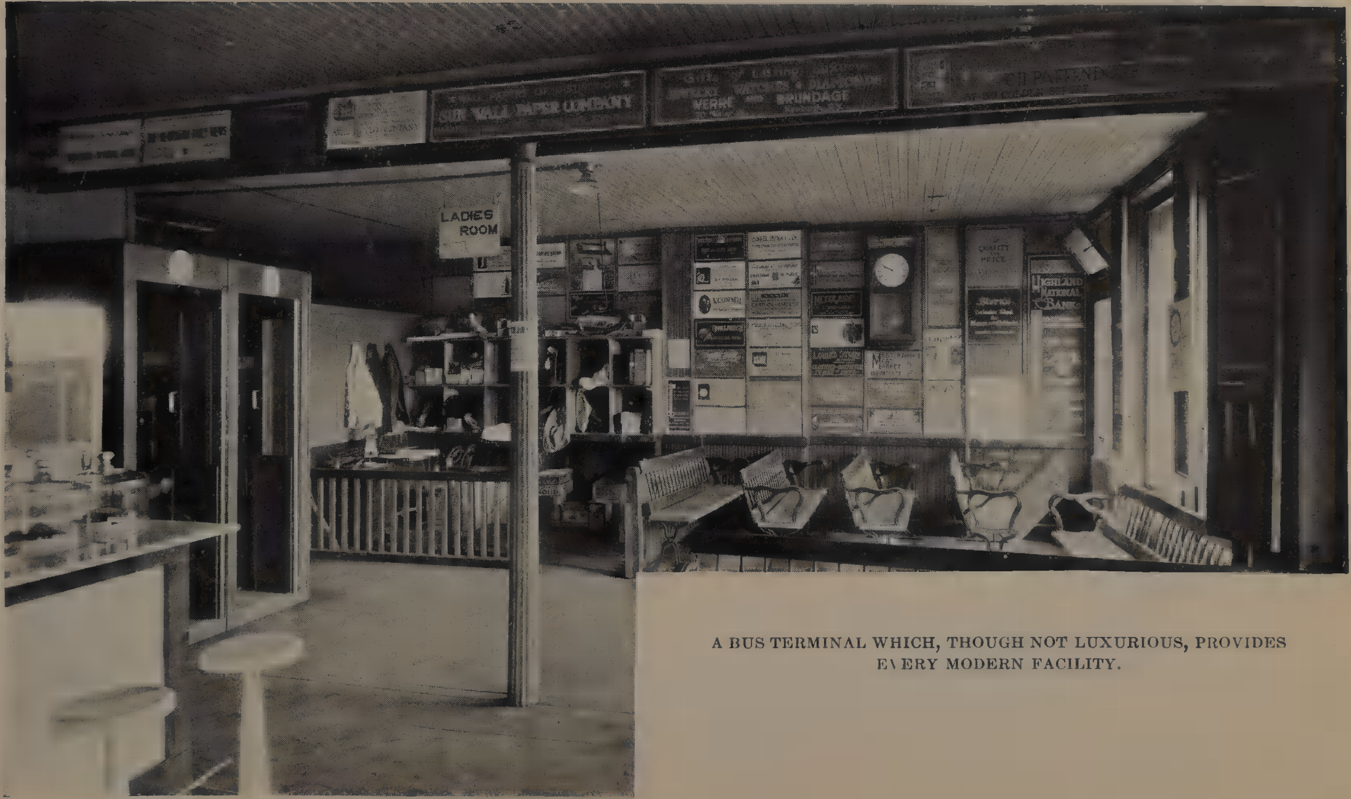
An interesting feature of the decorations is the use of the Minnesota Motor Bus Association's "Travel by Bus" slogan for many purposes, in order to keep it before the eyes of patrons of the lines. The waiting room is decorated with a band made up of the words of the slogan, extending clear around the room. The words are printed at other points where they are conspicuous and can be used to good effect. In addition, the uniforms of concessionaire's employees bear the slogan in conspicuous letters.

Terminal Hotels

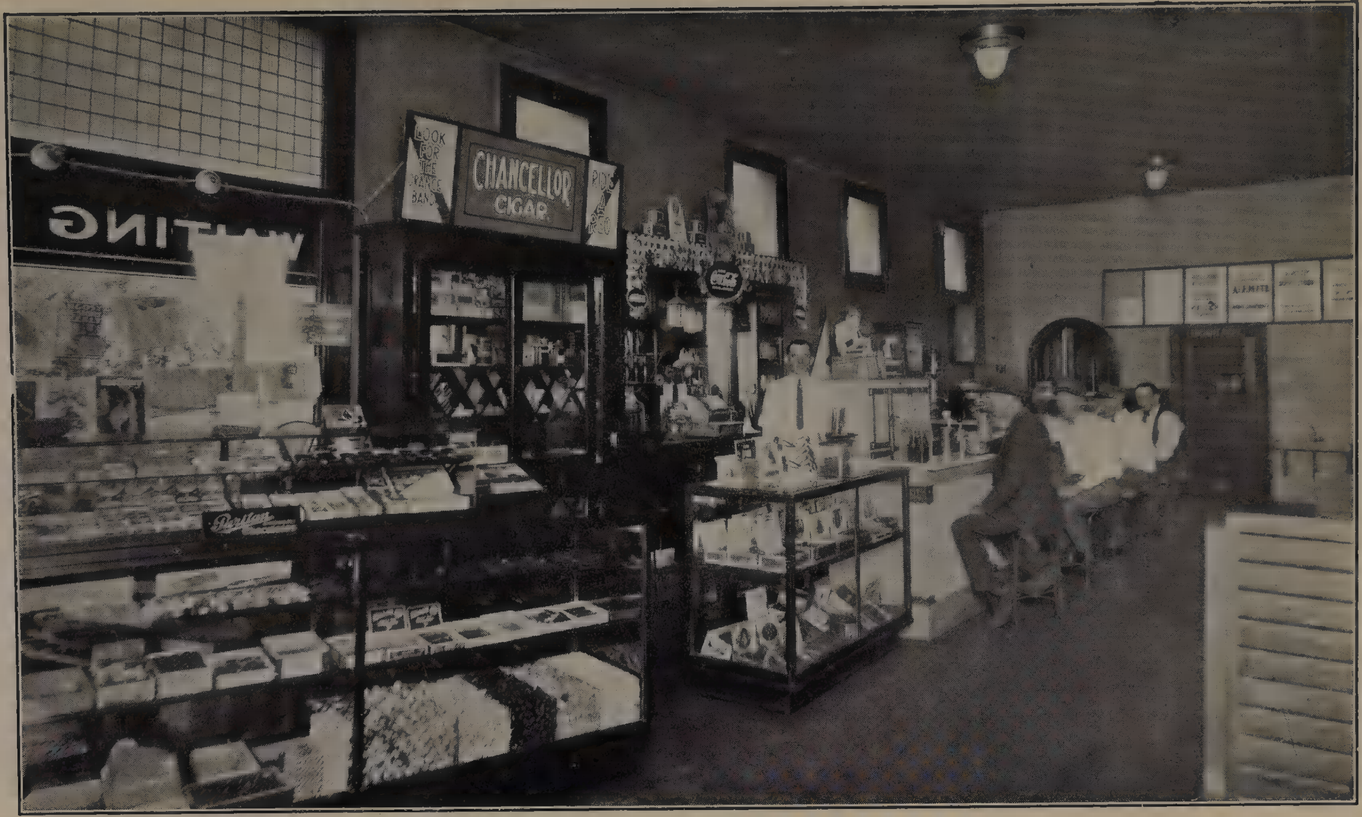
One type of terminal which is coming to the fore is the combination terminal and hotel. Such establishments should prove very popular in the near future as those which have already been built have turned out to be well worth the investment entailed. Patrons of interurban buses do not like to hunt around for a suitable hotel when arriving at a strange town after dark, and if they can be accommodated with pleasing and comfortable rooms by merely walking up stairs from the terminal unloading platform they will become ardent boosters of the line. One of the factors which will contribute to the popularity of this type of terminal is the lack of noise, smoke and dirt. Steam railroad terminals and depots are seldom ideal locations for hotels. Not alone on account of the noise and dirt but owing to the fact that such stations are usually located in the most unsuitable parts of the town or city from the standpoint of personal comfort and attractiveness. There are few objectionable features in connection with the operation of a bus terminal. The buses themselves are quiet and make no smoke unless there is something radically wrong with them in which case they would not enter the terminal but would discharge their passengers and proceed to the garage for repair. In any case they can not belch forth clouds of cinders and soot. By reason of the absence of any nuisance in connection with bus operation these terminal hotels can be established in the very best sections of the city.



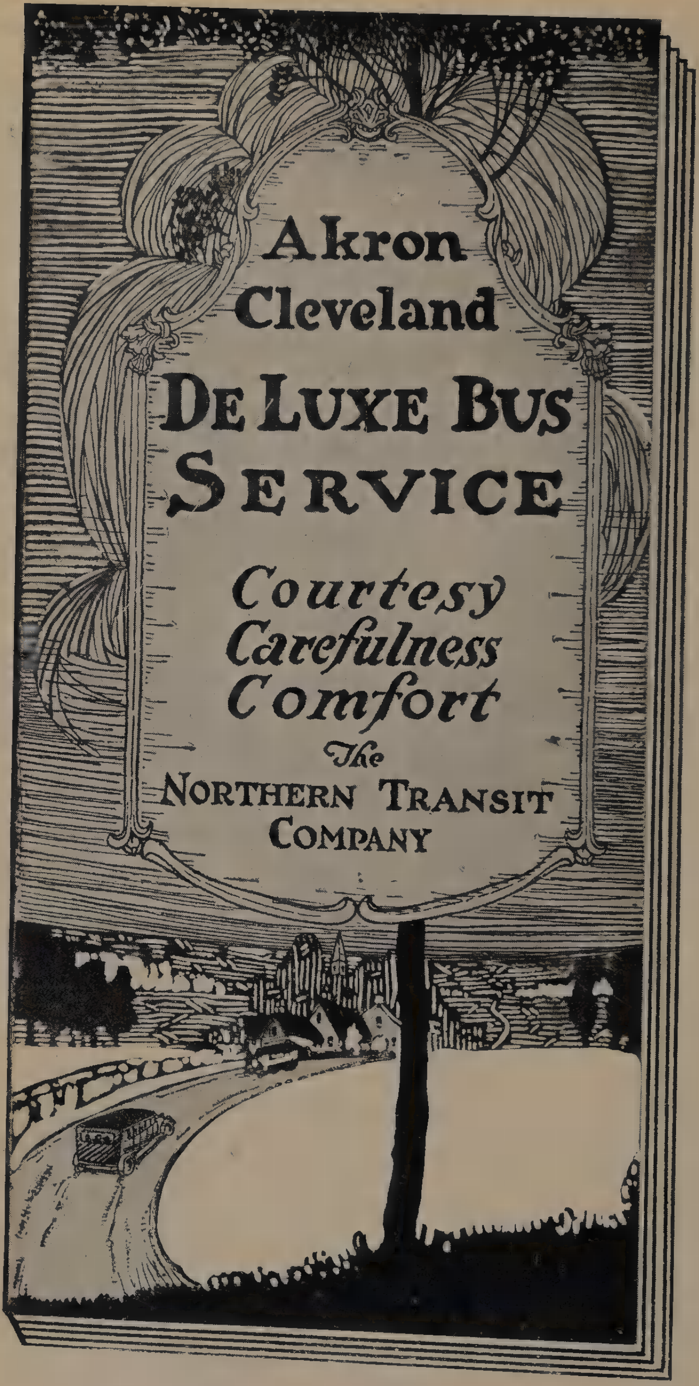
A BUS TERMINAL WHICH IS THE BEST MEDIUM OF ADVERTISING THAT A LINE CAN HAVE. HERE THE PATRONS CAN WAIT IN COMFORT AND SECURITY WHILE AT THE SAME TIME THEY ARE INFORMED OF ARRIVALS AND DEPARTURES BY A LARGE BULLETIN BOARD IN THE FRONT OF THE STATION.



A BUS TERMINAL WHICH, THOUGH NOT LUXURIOUS, PROVIDES EVERY MODERN FACILITY.



CONCESSIONS, THOUGH PROFITABLE TO THE BUS LINE OPERATOR, NEED NOT DETRACT FROM THE APPEARANCE OF THE TERMINAL.



NEAT, ATTRACTIVE POSTERS ARE VERY PRODUCTIVE MEANS OF PRESENTING BUS-LINE ADVERTISING TO THE PUBLIC.

CHAPTER V

Selling the Service

IT has been said that "experience is the great teacher." Unfortunately experience often comes high, but fortunately, on the other hand, bus operators are able to take advantage of the publicity given the subject of motor transportation from its earliest inception and unless they are particularly blind, can turn the misfortunes of their predecessors into a means of success for themselves. Almost too late the steam railroads, and the electric railways came to realize the value of public goodwill. In consequence men everywhere in these two industries are striving to free them from wrong and harmful impressions. Very slowly at first it began to dawn on the operators of both these public utilities that indifference leads to still further indifference and that as a consequence a utility company's success depends on the attitude of the public towards it, and its understanding of its affairs. Regardless of the line of endeavor, public indifference has, and always will, spell ruin.

Bus operators are merchants, and like butchers and bakers have commodities to sell. The operator of a single bus, or a line, or a fleet of buses is selling transportation and like all other organizations which sell their products to the public, must be governed by certain well-defined and definitely established rules of salesmanship. As previously stated, the company selling transportation must meet the approval of the public. It must secure the good will of the people residing within the territory through which it operates, otherwise it cannot, and will not attract maximum patronage.

What are some of the best methods for a bus operating company to use?

It is not sufficient merely to render service which does not excite complaint. The service should be of such character that it will earn the active enthusiasm of its patrons. Service can only be a valuable sales asset when it is better than actually expected. It must be superior service. When a passenger waits on the corner for transportation he must not be kept waiting too long. This is of course obvious, but after he boards the bus he expects to find a comfortable seat where he can read his paper in a good light. If he boards the car in the rush hour he at least expects that he will not be too crowded or uncomfortable. For service of this kind he expects to pay a reasonable fare. He arrives at his destination and immediately forgets the existence of the bus in which he has just ridden. If he has nothing but negative thoughts he probably will repeat the performance when occasion arises and becomes a passive supporter of the company. When called on for an opinion of this particular line he will neither "knock it" nor "boost it," merely confining his remarks to some such statement as "fair enough" or "have nothing against it."

Service Should Excite Comment

If passengers are treated discourteously their resentment may be out of all proportion to the offense. It is hard to tell how widespread the effects of the ill-will thus created may be or to what extent the efforts of the company to foster public good will by advertising and other means will be offset and nullified by this means. This point cannot be emphasized too strongly as it is possible for one ill-natured employee to destroy more good-will than an entire season's advertising campaign can build up. Or on the other hand little courtesies, which cost the conductor nothing in either time or patience, will convert a rider with a negative idea into a positive booster.

Wanted Higher Fare and Better Service

A striking example of an instance where superior service actually paid dividends occurred in an Eastern city. There were two bus lines operating over the same route. One charged a five cent fare, while the other a seven cent fare. In the course of the litigation started for the purpose of arriving at the status of the competing lines, testimony was given by many of the residents of the section. This testimony was to the effect that owing to the superior and unequaled service given by the line charging a seven cent fare, they were willing to continue paying this fare regardless of the fact that the competing company charged less. It was the opinion of the residents that service was far more important than the amount of the fare, and on this testimony the permit of the company charging the five cent fare was rescinded.

There are various factors which affect good will. Some of these factors are controlled by the owners of the line directly, others only in an indirect manner. For instance, the public prefers to ride in pleasing appearing buses. The paint must be fresh and clean. The upholstery must not be soiled, torn, or otherwise unsightly. The floors must be clean. The buses must be plainly marked with destination signs. The schedule must be satisfactory. If the bus must stop at frequent intervals to take on more passengers, the headway must be short in order that there may be no undue crowding or other discomforts. These factors of service are directly controlled by the operators of the line.

Other factors are controlled only indirectly by the operators. For instance, the driver of a bus can cause considerable inconvenience, delay, and general dissatisfaction if he does not stop his vehicle as close to the curb as practicable, on a given side of the street corner or at a predetermined distance from the corner. Of course the operator should instruct the driver as to what course he must pursue; in some instances actually having stop signs painted on the pavement and it is up to the operator to see that his orders are carried out.

Driver All-Important

The motor bus is primarily a one-man controlled vehicle and consequently the driver has many duties. He is primarily a conductor and as such the good will of his employers lies in the palm of his hand. In this connection an official of one of the largest operating companies in the country has declared, "A company may build the finest coach in the world; it may select routes beyond criticism in the matter of convenience and attention to public interest, but in the last analysis the factor that impresses the generous and appreciative public most of all is daily contact with sound, kindly and efficient public servants—the men." This point has been further emphasized by the President of the American Electric Railway Association who stated recently, "No matter how elaborate a company's advertising programme may be, no matter how sincere its policies, it is not going to get very far with the public unless its point of contact—the employee—is of the right kind."

When the crew of one is both driver and conductor, he must be of the highest type obtainable, as his duties are very complicated. His patience will often be strained to the breaking point by his relations with the many types of riders, who consider that courtesy should be one sided and who feel themselves well within their rights when making it as hard as possible for the crew to hold its temper.

When buses are manned with a crew of two, the driver must be a good driver who follows conscientiously the orders given him by his employer, and the conductor must be a tactful, courteous individual who treats all patrons with respect and who feels that he is the direct representative of his firm in its relations with the public.

How to Advertise the Service

While it is true that well satisfied and happy riders constitute a form of advertising which must not be discounted, special efforts should be made to keep the subject of passenger transportation in general and bus lines in particular, before the public. This can be done by means of publicity campaigns. The operator must sell his service to the public, and while he is primarily interested in that phase of advertising which influences riders, he must not overlook the fact that the public cannot be sold unless it is well informed as to what the bus operating company has to sell. The average citizen is not prone to analyse or investigate, but is inclined to purchase that which has been brought to his attention in a fitting manner. If a prospective patron is in doubt as to what points are covered by the bus route, he will take that form of transportation which he is certain will carry him to his destination. Or on the other hand, he may be deterred from going at all.

Co-operate with the Newspapers

Bus advertising may be divided into two general divisions: publicity or free advertising, and paid advertising. Publicity is the advertising obtained by making known through the news columns of the local papers interesting items concerning the bus line's activities. References to the bus line will frequently appear in speeches or reports. Publicity has a strong influence on the success of a bus line, so everything should be done to increase favorable comment, and to minimize unfavorable publicity.

A bus line represents a public service, and anything which affects the public, or at least a major portion of it, provides an opportunity to secure some good publicity. Anything about the line which in any way affects the public constitutes news and should appear as news in the columns of local newspapers. Operators are very fortunate that their business is of such great interest to the public and full advantage can be taken of this very easily, and with great profit. Newspapers are perhaps the best publicity media. It is advisable that operators establish close and friendly contact with publishers and editors of newspapers.

As the bus lines will ordinarily advertise in the newspapers, the papers will usually be found willing to give co-operation in the way of news space for bus line features. It is well to establish a systematic service for the newspapers, sending them a letter when anything occurs which might be of public interest. A few minutes can be set aside at a certain time each day when concentrated thought can be given this subject and an earnest effort made to discover some item of news for the papers. Of course, when anything of an unusual nature occurs, the papers should be notified at once by telephone or personal call.

Publicity Items of Interest

News items can be built up on such things as the establishment of a new line, the addition of a new route to the line, new time tables, new terminals, or alternations to the old ones, the addition of new buses, or in fact, anything which is an innovation or which has been added to still further increase public convenience.

Practically every live operator takes steps to train and instruct his employees. Many such operators conduct schools in which the routine and special work of the employees is gone over in detail in order that every man in the organization shall be letter perfect in his share of the operation. The purpose of this school primarily is to cut down accidents, to breed general satisfaction among the patrons of the line, and to keep operating costs down to a minimum. Many, however, forget that the public is not acquainted with the facts that such a school is in existence, and do not therefore take advantage of a very subtle form of advertising.

The newspapers may be invited to send reporters to representative sessions of such schools. They could be told of the ideals which prompted the formation of the school and given assistance in building up an interesting news story for the papers. A news item of this kind will be read by thousands of actual or potential bus riders, and will be given new thought and consideration by the majority of the readers. Conversations on these subjects will ensue and the resulting indirect advertising will be well worth the trouble.

In these publicity articles, the public can be convinced that their complaints will be well received and that they will get satisfaction from the company. It should be shown how special equipment is installed in order that the buses can be well heated in the winter and well ventilated in the summer. In fact, everything which the transportation companies do either advisedly or ill-advisedly constitutes subject matter for news items in the local papers.

All publicity is not necessarily favorable. Accidents do occur. Delays are sometimes unavoidable; breakdowns cannot be wholly prevented, and if the bus operator leaves the reporting of such incidents to the unaided discretion of the newspaper he runs a grave risk of suffering from unfavorable publicity. Objections registered with the editor or advertising manager after an ill-advised or inaccurate report has been published will usually prove inaffective and are apt to create antagonism in the minds of the publishers which will aggravate, rather than improve conditions. Much of this can be avoided if the operator will see whenever an incident of this sort arises, that an investigation is made on the spot immediately, and the company's side of the story communicated to all the newspapers by the time the reporters have turned in their own version.

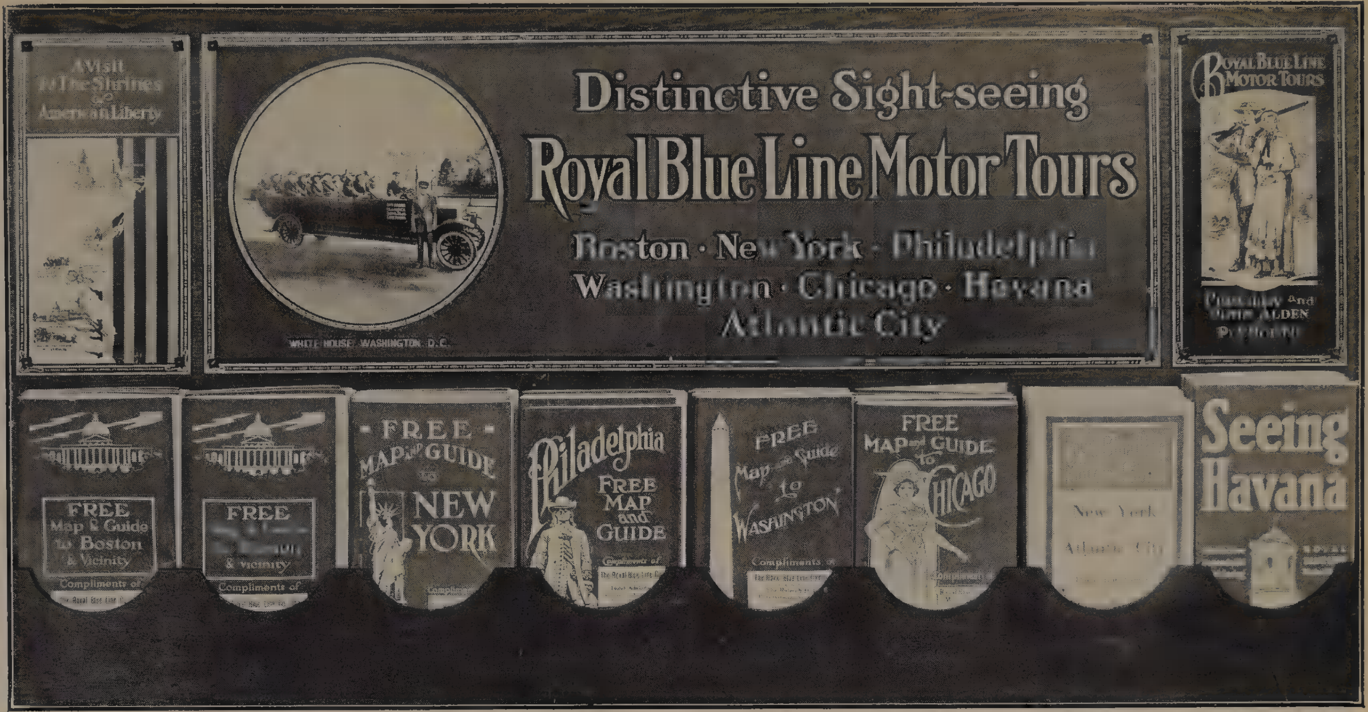
In most cases sensational and overdrawn accounts of accidents and the like are not made with malicious intent but merely for the purpose of creating startling or sensational news. Often exaggerated reports and ill-advised and hasty editorial conclusions are due entirely to the fact that the newspapers have a one-sided view which is often the fault of the bus operator himself.

The first problem confronting an operating company is that of selling their service to the public, but after having informed the public of their existence and of their aims and ideals, no stone must be left unturned which will still further sell the company's idea.

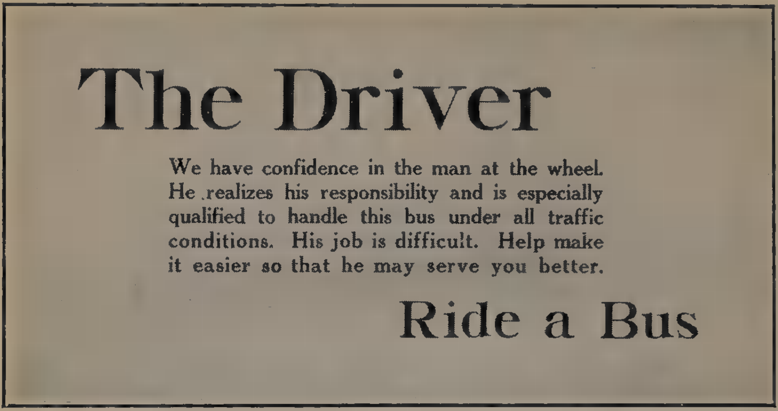
Building Public Good Will

It is well enough to loan buses to orphan asylums, to convey the idea that the operators are public-spirited individuals and desire to devote some of their time and money to charitable organizations. But acts of this kind are not sufficient to keep the public's good-will as it takes but few infractions of common rules or of judgment to offset all of the favorable attention obtained by what are, obviously, public-spirited acts.

A plan which usually results in good newspaper publicity is to make up a well thought out public safety plan and to take it to the editors for their co-operation. Safety is being preached in all sections of the country. This is the natural reaction from the tremendous loss of life during the war. City after city has had, or is having a "no accident" week. Railroads have conducted "safe-crossing" campaigns and progress is being made in many ways in promoting greater precautions against accidents. Jay-walking is being discouraged, and more than one


A Visit to The Shrines of American Liberty
Distinctive Sight-seeing
Royal Blue Line Motor Tours
Boston · New York · Philadelphia
Washington · Chicago · Havana
Atlantic City
WHITE HOUSE WASHINGTON D.C.
Royal Blue Line Motor Tours
Priscilla and John Alden
FREE Map & Guide to Boston & Vicinity
Compliments of
FREE
& vicinity
Compliments of
FREE MAP and GUIDE to NEW YORK
Philadelphia FREE MAP and GUIDE
Compliments of
FREE Map and Guide to WASHINGTON
Compliments of
FREE MAP and GUIDE to CHICAGO
New York
Atlantic City
Seeing Havana

MUCH OF THE VALUE OF ADVERTISING LITERATURE IS LOST UNLESS THE BOOKLETS, TIME-TABLES, MAPS, ETC., ARE DISPLAYED IN AN ORDERLY AND ATTRACTIVE MANNER.

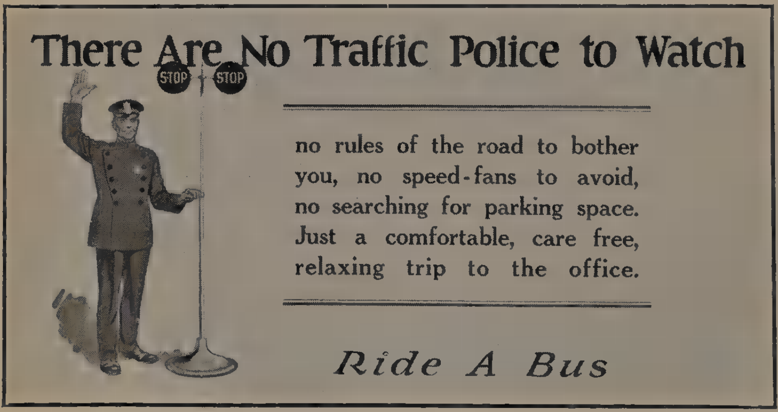


The Driver

We have confidence in the man at the wheel. He realizes his responsibility and is especially qualified to handle this bus under all traffic conditions. His job is difficult. Help make it easier so that he may serve you better.

Ride a Bus

BLANK SPACES WHERE CAR-CARD ADVERTISING HAS NOT BEEN SOLD ARE VERY UNSIGHTLY.

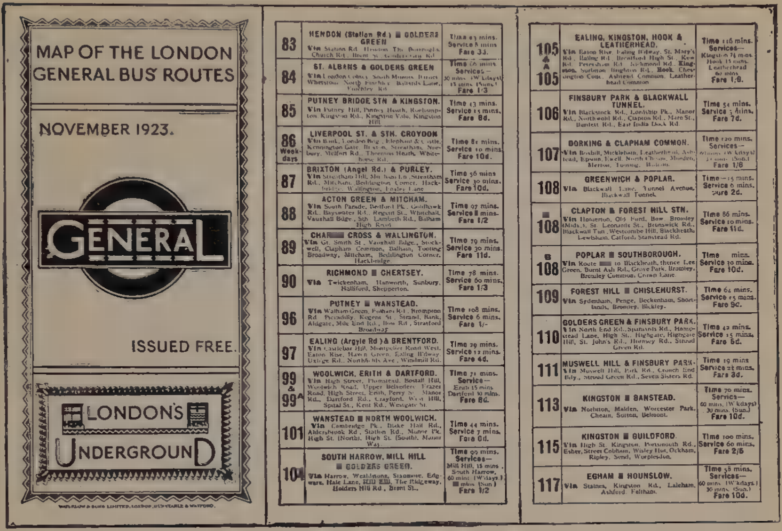


There Are No Traffic Police to Watch

no rules of the road to bother you, no speed-fans to avoid, no searching for parking space. Just a comfortable, care free, relaxing trip to the office.

Ride A Bus

THE OPERATOR CAN HAVE CARDS PREPARED WHICH WILL PREVENT BLANK SPACES FROM REACTING UNFAVORABLY ON THE PATRONS.



MAP OF THE LONDON GENERAL BUS ROUTES

NOVEMBER 1923.

GENERAL

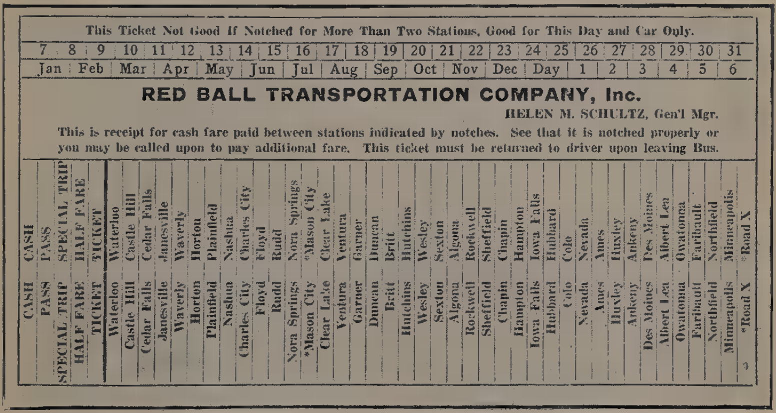
ISSUED FREE.

LONDON'S UNDERGROUND

WATERLOW & SONS LIMITED, LONDON, DUNSTABLE & WATFORD.

83	**HENDON (Station Rd.) [illegible] GOLDERS GREEN** **Via** Station Rd., Hendon The Burroughs, Church Rd., Brent St., [illegible] Rd.	Time 43 mins. Service 8 mins. Fare 3d.
84	**ST. ALBANS & GOLDERS GREEN** **Via** London Colney, South Mimms, Barnet, Whetstone, North Finchley, Ballards Lane, Finchley Rd.	Time 86 mins. Services— 30 mins. (W'kdays) 15 mins. (Sun.) Fare 1/3
85	**PUTNEY BRIDGE STN & KINGSTON.** **Via** Putney Hill, Putney Heath, Roehampton, Kingston Rd., Kingston Vale, Kingston Hill	Time 43 mins. Service 15 mins. Fare 8d.
86 Weekdays	**LIVERPOOL ST. & STH. CROYDON** **Via** Bank, London Bdg., Elephant & Castle, Kennington Gate, Brixton, Streatham, Norbury, Melfort Rd., Thornton Heath, Whitehorse Rd.	Time 81 mins. Service 10 mins. Fare 10d.
87	**BRIXTON (Angel Rd.) & PURLEY.** **Via** Streatham Hill, [illegible] Ln., Streatham Rd., Mitcham, Beddington Corner, Hackbridge, Wallington, Foxley Lane	Time 56 mins. Service 30 mins. Fare 10d.
88	**ACTON GREEN & MITCHAM.** **Via** South Parade, Bedford Pk., Goldhawk Rd., Bayswater Rd., Regent St., Whitehall, Vauxhall Bdge., Sth. Lambeth Rd., Balham High Road	Time 97 mins. Service [illegible] mins. Fare 1/2
89	**CHAR[illegible] CROSS & WALLINGTON.** **Via** Gt. Smith St., Vauxhall Bdge., Stockwell, Clapham Common, Balham, Tooting Broadway, Mitcham, Beddington Corner, Hackbridge.	Time 79 mins. Service 30 mins. Fare 11d.
90	**RICHMOND [illegible] CHERTSEY.** **Via** Twickenham, Hanworth, Sunbury, Halliford, Shepperton.	Time 78 mins. Service 60 mins. Fare 1/3
96	**PUTNEY [illegible] WANSTEAD.** **Via** Walham Green, Fulham Rd., Brompton Rd., Piccadilly, Regent St., Strand, Bank, Aldgate, Mile End Rd., Bow Rd., Stratford Broadway	Time 108 mins. Service 6 mins. Fare 1/-
97	**EALING (Argyle Rd.) & BRENTFORD.** **Via** Castlebar Hill, Montpelier Road West, Eaton Rise, Haven Green, Ealing B'dway, Uxbridge Rd., Northfields Ave., Windmill Rd.	Time 29 mins. Service 12 mins. Fare 4d.
99 & 99A	**WOOLWICH, ERITH & DARTFORD.** **Via** High Street, Plumstead, Bostall Hill, Woolwich Road, Upper Belvedere, Frazer Road, High Street, Erith, Perry St., Manor Rd., Dartford Rd., Crayford, West Hill, Spital St., Kent Rd., Westgate St.	Time 71 mins. Service— Erith 15 mins. Dartford 30 mins. Fare 8d.
101	**WANSTEAD [illegible] NORTH WOOLWICH.** **Via** Cambridge Pk., Blake Hall Rd., Aldersbrook Rd., Station Rd., Manor Pk., High St. (North), High St. (South), Manor Way.	Time 44 mins. Service 7 mins. Fare 6d.
10[illegible]	**SOUTH HARROW, MILL HILL [illegible] GOLDERS GREEN.** **Via** Harrow, Wealdstone, Stanmore, Edgware, Hale Lane, Mill Hill, The Ridgeway, Holders Hill Rd., Brent St.	Time 95 mins. Services— Mill Hill, 15 mins., South Harrow, 60 mins. (W'days.) [illegible] mins. (Sun.) Fare 1/2
105 & A 105	**EALING, KINGSTON, HOOK & LEATHERHEAD.** **Via** Eaton Rise, Ealing B'dway, St. Mary's Rd., Ealing Rd., Brentford High St., Kew Rd., Petersham Rd., Richmond Rd., **Kingston**, Surbiton, [illegible] Rd., **Hook**, Chessington Com., Ashtead Common, Leatherhead Common	Time 116 mins. Services— Kingston 7½ mins. Hook 15 mins. Leatherhead 60 mins. Fare 1/8.
106	**FINSBURY PARK & BLACKWALL TUNNEL.** **Via** Blackstock Rd., Lordship Pk., Manor Rd., Northwold Rd., Clapton Rd., Mare St., Burdett Rd., East India Dock Rd.	Time 54 mins. Service 5 mins. Fare 7d.
107	**DORKING & CLAPHAM COMMON.** **Via** Boxhill, Mickleham, Leatherhead, Ashtead, Epsom, Ewell, North Cheam, Morden, Merton, Tooting, Balham.	Time 120 mins. Services— 60 mins. (W'kdays) 30 mins. (Sun.) Fare 1/8
108	**GREENWICH & POPLAR.** **Via** Blackwall Lane, Tunnel Avenue, Blackwall Tunnel	Time 15 mins. Service 6 mins. Fare 2d.
[illegible] 108	**CLAPTON & FOREST HILL STN.** **Via** Homerton, Old Ford, Bow, Bromley (Middx.), St. Leonards St., Brunswick Rd., Blackwall Tun., Westcombe Hill, Blackheath, Lewisham, Catford, Stanstead Rd.	Time 86 mins. Service 10 mins. Fare 11d.
B 108	**POPLAR [illegible] SOUTHBOROUGH.** **Via** Route [illegible] to Blackheath, thence Lee Green, Burnt Ash Rd., Grove Park, Bromley, Bromley Common, Crown Lane.	Time mins. Service 30 mins. Fare 10d.
109	**FOREST HILL [illegible] CHISLEHURST.** **Via** Sydenham, Penge, Beckenham, Shortlands, Bromley, Bickley.	Time 64 mins. Service 15 mins. Fare 9d.
110	**GOLDERS GREEN & FINSBURY PARK.** **Via** North End Rd., Spaniards Rd., Hampstead Lane, High St., Highgate, Highgate Hill, St. John's Rd., Hornsey Rd., Stroud Green Rd.	Time 42 mins. Service 15 mins. Fare 6d.
111	**MUSWELL HILL & FINSBURY PARK.** **Via** Muswell Hill, Park Rd., Crouch End B'dy., Stroud Green Rd., Seven Sisters Rd.	Time 19 mins. Service 2½ mins. Fare 3d.
113	**KINGSTON [illegible] BANSTEAD.** **Via** Norbiton, Malden, Worcester Park, Cheam, Sutton, Belmont.	Time 70 mins. Services— 60 mins. (W'kdays) 30 mins. (Sun.) Fare 10d.
115	**KINGSTON [illegible] GUILDFORD.** **Via** High St. Kingston, Portsmouth Rd., Esher, Street Cobham, Wisley Hut, Ockham, Ripley, Send, Worplesdon.	Time 100 mins. Service 60 mins. Fare 2/6
117	**EGHAM [illegible] HOUNSLOW.** **Via** Staines, Kingston Rd., Laleham, Ashford, Feltham.	Time 58 mins. Services— 60 mins. (W'kdays.) 30 mins. (Sun.) Fare 10d.

AN EXAMPLE OF HOW A GREAT DEAL OF INFORMATION CAN BE COMPRESSED INTO CONVENIENT FORM.



This Ticket Not Good If Notched for More Than Two Stations, Good for This Day and Car Only.

7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Day	1	2	3	4	5	6

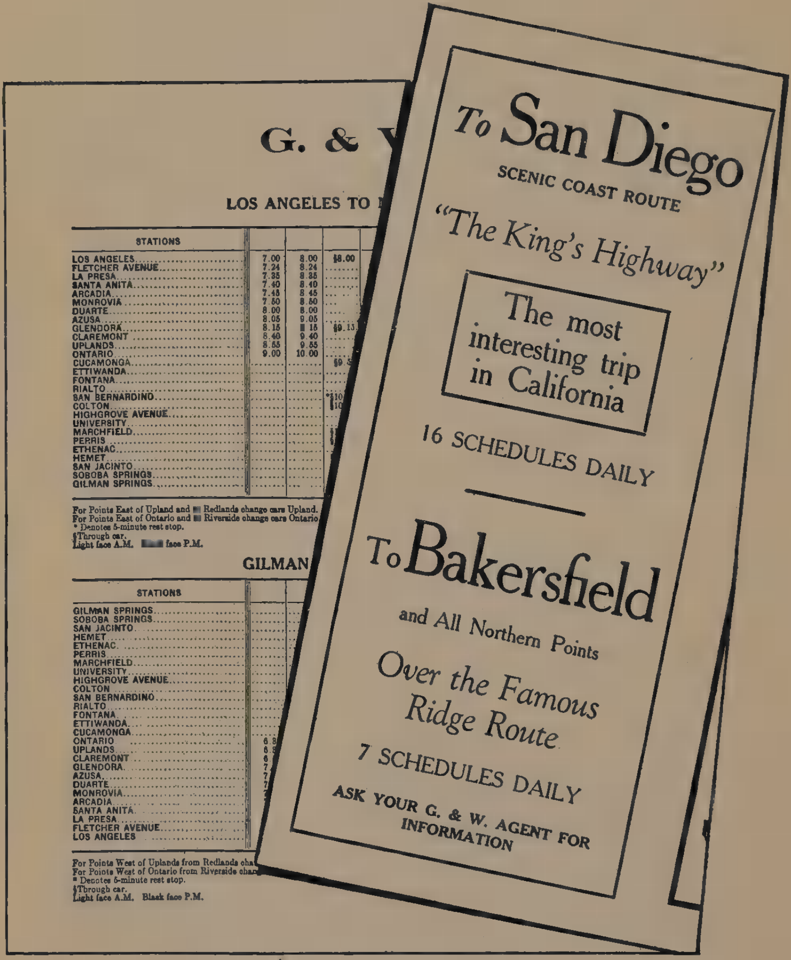
RED BALL TRANSPORTATION COMPANY, Inc.

HELEN M. SCHULTZ, Gen'l Mgr.

This is receipt for cash fare paid between stations indicated by notches. See that it is notched properly or you may be called upon to pay additional fare. This ticket must be returned to driver upon leaving Bus.

CASH	CASH
PASS	PASS
SPECIAL TRIP	SPECIAL TRIP
HALF FARE	HALF FARE
TICKET	TICKET
Waterloo	Waterloo
Castle Hill	Castle Hill
Cedar Falls	Cedar Falls
Janesville	Janesville
Waverly	Waverly
Horton	Horton
Plainfield	Plainfield
Nashua	Nashua
Charles City	Charles City
Floyd	Floyd
Rudd	Rudd
Nora Springs	Nora Springs
*Mason City	*Mason City
Clear Lake	Clear Lake
Ventura	Ventura
Garner	Garner
Duncan	Duncan
Britt	Britt
Hutchins	Hutchins
Wesley	Wesley
Sexton	Sexton
Algona	Algona
Rockwell	Rockwell
Sheffield	Sheffield
Chapin	Chapin
Hampton	Hampton
Iowa Falls	Iowa Falls
Hubbard	Hubbard
Colo	Colo
Nevada	Nevada
Ames	Ames
Huxley	Huxley
Ankeny	Ankeny
Des Moines	Des Moines
Albert Lea	Albert Lea
Owatonna	Owatonna
Faribault	Faribault
Northfield	Northfield
Minneapolis	Minneapolis
*Road X	*Road X

A FORM OF TICKET WHICH LEAVES LITTLE TO BE DESIRED EITHER FROM THE STANDPOINT OF THE PATRON OR THE OPERATOR.



G. &

LOS ANGELES TO

STATIONS			
LOS ANGELES	7.00	8.00	§8.00
FLETCHER AVENUE	7.24	8.24	....
LA PRESA	7.35	8.35	....
SANTA ANITA	7.40	8.40	....
ARCADIA	7.48	8.45	....
MONROVIA	7.50	8.50	...
DUARTE	8.00	8.00	....
AZUSA	8.05	9.05	......
GLENDORA	8.15	■ 15	§9.13
CLAREMONT	8.40	9.40	......
UPLANDS	8.55	9.55	....
ONTARIO	9.00	10.00	......
CUCAMONGA	....	....	§9.5
ETTIWANDA	....	....	......
FONTANA	....	....	......
RIALTO	....	....	......
SAN BERNARDINO	....	....	*§10
COLTON	....	....	§10
HIGHGROVE AVENUE	....	....	......
UNIVERSITY	....	....	......
MARCHFIELD	....	....	§
PERRIS	....	....	§
ETHENAC	....	....	......
HEMET	....	....	......
SAN JACINTO	....	....	......
SOBOBA SPRINGS	....	....	......
GILMAN SPRINGS	....	....	......

For Points East of Upland and ■ Redlands change cars Upland.
For Points East of Ontario and ■ Riverside change cars Ontario
* Denotes 5-minute rest stop.
§Through car.
Light face A.M. ■ face P.M.

GILMAN

STATIONS		
GILMAN SPRINGS	....	...
SOBOBA SPRINGS	....	...
SAN JACINTO	....	...
HEMET	....	...
ETHENAC	....	...
PERRIS	....	...
MARCHFIELD	....	...
UNIVERSITY	....	...
HIGHGROVE AVENUE	....	
COLTON	....	
SAN BERNARDINO	....	
RIALTO	....	
FONTANA	....	
ETTIWANDA	....	
CUCAMONGA	....	
ONTARIO	6.8	
UPLANDS	6.8	
CLAREMONT	6.	
GLENDORA	7.	
AZUSA	7	
DUARTE	7	
MONROVIA	7	
ARCADIA		
SANTA ANITA		
LA PRESA		
FLETCHER AVENUE		
LOS ANGELES		

For Points West of Uplands from Redlands cha
For Points West of Ontario from Riverside chan
* Denotes 5-minute rest stop.
§Through car.
Light face A.M. Black face P.M.

To San Diego
SCENIC COAST ROUTE
"The King's Highway"

The most interesting trip in California

16 SCHEDULES DAILY

To Bakersfield
and All Northern Points
Over the Famous Ridge Route
7 SCHEDULES DAILY

ASK YOUR G. & W. AGENT FOR INFORMATION

TIME-TABLES SHOULD NOT ONLY CONTAIN FULL INFORMATION ON THE SCHEDULES, BUT SHOULD BE OF CONVENIENT SHAPE.

city is taking the attitude that the person who crosses a highway at points other than at designated crossings, is just as responsible for an accident as the driver.

No industry will profit more from such measures than bus transportation. No matter how careful a bus driver is, he cannot protect himself against either the jay-walker, or the incompetent or malicious truck, taxi or passenger car driver. These safety campaigns have reduced street hazards to a very marked degree, a fact which should prove of great benefit both to the mind of the bus driver and the pocket book of the bus owner. It is a significant fact that the various automobile associations, both local and national, have enlisted the interest of all automobile owners in this work.

The American Automobile Association has called attention through its publicity service, to the fact that pedestrians who walk along the right side of country roads constitute a hazard both to themselves and to the automobile owner and driver. When walking on the right side of the road their backs are to oncoming vehicles. Accordingly this association is pushing an active campaign to persuade pedestrians to walk on the left side of all highways which are not provided with sidewalks. In so doing they face oncoming vehicles and are better able to see and avoid them. This is particularly true at night. This is but one instance of the publicity given the various hazards of the road as the general message conveyed to the public is, that both automobile drivers and pedestrians are culpable, and if the pedestrian cannot be convinced that it is dangerous for him to wander around on dark roads, it is the duty of those driving cars to take even more than their share of precaution in order to prevent accidents.

Buses are larger than passenger cars. They cannot stop as quickly and as a consequence safety campaigns are even more necessary in these days of ever increasing bus-line operations than during the period when the roads were used almost exclusively by wagon or passenger car traffic.

Co-operate in Emergencies

Emergency service by buses always creates favorable publicity. For instance, during the recent street railwaymen's strike in Newark, N. J., the buses which were brought in to serve the public during the strike, were kept in the news headlines for ninety days. During this emergency period the bus operators profited greatly, and through the publicity given them, and the good will obtained, the bus line operators in this territory are still maintaining large patronage.

Operators should establish friendly contacts with all public bodies, such as Chambers of Commerce, Boards of Trade, Rotary, Kiwanis and Lions Clubs, Community Organizations, Manufacturers' and Business Men's Associations, Civic Clubs, Improvements Associations, etc. Anything that might possibly be of interest to these organizations should be given to them without delay. It is even possible to go to meetings held by these various organizations and make short speeches on what the bus lines are doing for the public.

It is also well to establish friendly relations with public officials or prominent citizens such as the Mayor of the Town, Chief of Police, Commissioner of Streets, Commissioner of Public Safety, Members of the Board of Aldermen, heads of large businesses and others. These individuals should always be kept informed of things of interest concerning the company. Discretion should be used, however, as all too often such public utilities as bus companies and traction concerns are sometimes made the goats of some politician's ride to power. Such a politician secures public favor by promising impossible fare reductions and by attacking public utility management, usually claiming that they are robbing the public.

As previously mentioned, the steam railroads and electric railways realized just in time that they must cater to public demands. For years many executives of common carriers have taken the attitude that their business was none of the public's business.

This attitude constituted a boomerang, for when the day of rising costs made it mandatory that fares be increased they found that their lack of frankness had instilled in the public's mind the idea that all railroads are rich and that as a consequence any demand for an increase in fare was highway robbery. The public has the right to know what becomes of the money it pays into the coffers of public utilities. The lesson has been learned from other public utilities with the result that bus operating companies must follow in the footsteps of the street railways and railroads in their publicity campaigns.

Bus companies, therefore, who are coming more and more under public regulation, should keep the public so well informed of their activities that when fare raises become imperative, or tax questions come up, bus companies will have the "jump" on their antagonists.

In general, the bus company will profit from public good will and in every way possible should endeavor to establish the most cordial and friendly relations with individuals and organizations. If this is persistently and properly carried out, it will not be long before the whole public will be thinking and talking favorably of the bus company. Publicity cannot do all the work of selling the bus company to the public, but if it is properly handled it can be made a very strong factor.

There are many ways by which paid advertising may be used to aid the line in its selling campaign. Of course most bus operators start in a small way, and do not at first feel justified in appropriating large sums of money unless immediate returns can be assured. It is advisable, therefore, for bus companies having limited budgets to lay out advertising campaigns of modest proportions, and to submit them to the local newspaper men for criticism.

It will usually be found that the local newspaper men are sufficiently familiar with advertising practices to aid the operator materially in his campaign. Every bus line should have a distinctive, dignified, and striking trade mark which the public will notice, understand and remember. This trade mark should be prominently displayed wherever possible. It should be placed on the inside and on the outside of the buses, on the uniforms of the crew, in the terminals, and should always appear on all signs, advertisements, letter heads, etc.

Booklets Useful and Profitable

For those lines operating on long hauls to scenic places, or making special tours of interest to people from all parts of the country who might travel long distances to see such places, it is at times advisable to advertise in magazines widely read by this class of people. In any case of this kind, the most expert advertising council should be employed to make an analysis. Local magazines such as the publications of clubs, or weekly periodicals may be profitably used when an investigation shows that they will prove good business producers for the bus line.

Newspaper advertising should be used universally. This type may be divided into two classes: the use of large display advertisements for special purposes, and routine advertising as a constant business getter. When the bus line commences operation it is always advisable, and usually necessary, to use large advertisements in the local papers. Before doing this, however, the advertising experts for the local papers should be freely and fully consulted. Similar advertisements should be used when anything of particular interest occurs, such as when buses are routed to include a new neighborhood or there is an extensive change in the time schedule, or any such items that carry public interest.

It is always well to run a constant campaign of newspaper advertising in those papers which are regularly sold and read by the residents on the route. There are numerous ways of doing this effectively. Sometimes small conventional advertisements of the bus company appearing daily in the papers will serve. In most cases, however, it is better to provide frequent changes in the copy and illustrations of the advertisements, giving the public selling points according to a carefully thought-out plan. This advertising should, and can, constantly stress such features as comfort, convenience, speed, economy, etc.

Time tables are necessary and in many cases contain printed schedules, maps showing the routes covered and the trade mark of the line together with other appropriate advertisements. Where connections are made with other bus or interurban electric lines or with steamships, ferries or steam railroads the time of connections should also be included in the time tables. As they are revised, the advertising should be changed to keep it fresh. In cases where extensive time tables are necessary, they can be made up as small booklets. Pictures of scenes, stories about points of interest along the route, etc., may be incorporated in the time table to good advantage. Time tables should be widely distributed in order that they will be available at all times to the public.

Hotels Help Produce Patronage

Arrangements for the distribution of time tables should be made with hotel clerks and storekeepers near terminals and stops, stations of connecting transportation lines, etc.; in fact these time tables should be so circulated that they will catch the attention of many potential riders who might not otherwise know of the line's existence. One very effective way in which a combination time table and booklet may be made up, is in the form of a miniature company magazine. It can contain all of the necessary features such as running schedules, pictures, etc., and at the same time interesting little stories of service by company employees and achievements of the company, all of which will serve to create a warm human interest as opposed to cold business interest. This little magazine can be published weekly or monthly and distributed freely in the communities along the route.

It might appear that advertising to this extent would involve considerable expense, and it might be reasoned that the advantages derived would not warrant such expense. However, it will be found that hotels and stores situated near the terminal points of the bus route will consider such a booklet to be a good advertising medium for them, and the revenue derived from the sale of advertising space will help materially to cover the cost of publishing it.

While in the main, advertising is done to increase the sales of one particular organization, co-operative advertising can be used profitably in many instances. There are many cases where one line will run into a town and terminate; while within the same town another line may have its origin, running out on routes which do not compete with that of the first line. In such cases, co-operative advertising can be done for the purpose of selling the idea of riding in buses, pointing out the many attractive features which all lines have, and being specific about the conveniences of the co-operative group. Advertising can also be done by bus lines in conjunction with street railways, steam railroads, boats, etc. This type of advertising can be very effective and is proving to various transportation systems that they are all working toward the same end.

This bitter rivalry of the past is being forgotten, and each has come to the realization that the riders on the bus, for instance, may ride on the boat or the train connecting with the line, if the co-operation between the various lines is made known to the public.

The buses themselves should be equipped with literature racks, placed in a position where riders can easily get at them, and contain time tables and booklets. Wherever lines pass points of general interest, it is politic to send folders, time tables and maps to the various railroads and travel bureaus for distribution.

Advertising display boards or posters also constitute good business. They can be made up to illustrate in an artistic way the different features of the line. They should be displayed at places where travelers congregate, such as terminals of the line, hotels, busy stops, traffic centers, etc. This is a very prevalent form of advertising and more will be said concerning its details in later paragraphs.

Advertising racks within the buses and terminals are treated, from the revenue earning standpoint, in a later chapter of this book.

However, these also offer facilities for effectively advertising the bus line and at least one space should be reserved for a live advertisement of the bus company's service. In selling this space some difficulty may be experienced at first in filling all of it with paying displays. This unsold space should not remain blank as it has a very adverse effect on the minds of patrons and advertisers. It can be filled to good advantage by the operator. He can conduct his own little safety campaign by means of appropriate cards and posters. Such items as text requesting that the patrons have their fare ready upon entering the buses, or a few words in attractive form describing more or less in detail the aims and ambitions of the operating company will serve not only to fill unsightly blank spaces but at the same time help materially in selling the bus line to the general public.

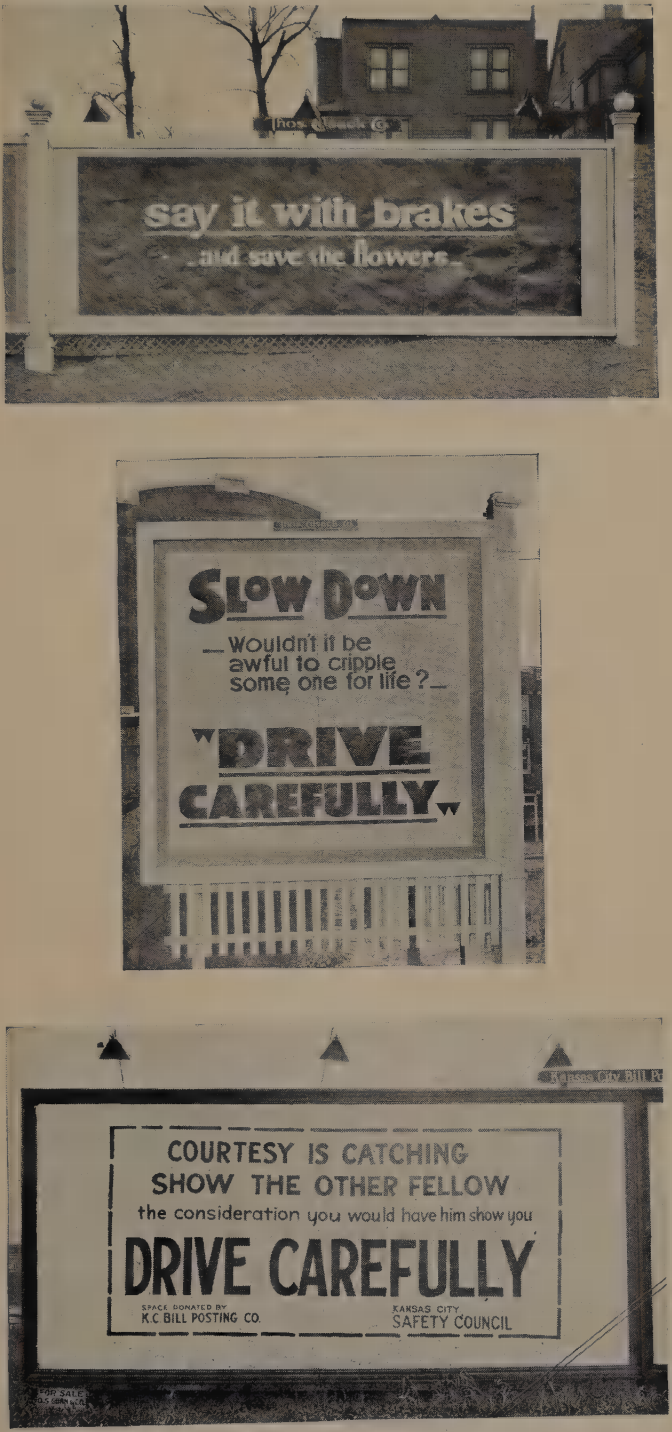
Bus Its Own Best Advertising

One of the best forms of advertising which any line can have is the bus itself. Its general appearance, cleanliness, and even the way in which it is operated acts as an advertisement. A color scheme which is unique, striking and dignified, should be selected and after it has been adopted, should be carried out in the terminals on the advertising signs, letter heads, time tables, etc. The appearance of the bus is, and should be, a symbol of the superior transportation service offered by the bus line.

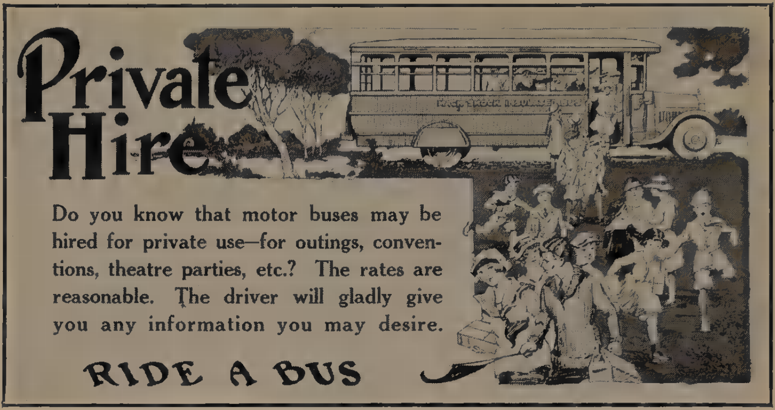
Every employee is a walking advertisement of the company. It is best to have those employees who ordinarily appear before the public neatly and comfortably uniformed, wearing badges which carry the trade mark of the line, the name of their job, and their own name written out in full on their caps or jackets.

Previously, it has been customary for bus line employees to be known by number only. This, however, is a mistake. The conductor of a bus is the company's representative—its salesman. Both the buyers and sellers of transportation are human beings and a badge containing the seller's name acts as an introduction and conveys to the passenger the fact that here is a personal representative of the company ready to serve him. This practice, however, works both ways, for when an employee is called by name instead of by a number, his interest in selling transportation will increase and in the end his own personal happiness will be more than doubled.

The conductors of many of the larger bus operators and street car companies wear personal introduction badges on their left breast pocket. These badges, as used by one company, are about 2⅞ inches wide and carry not

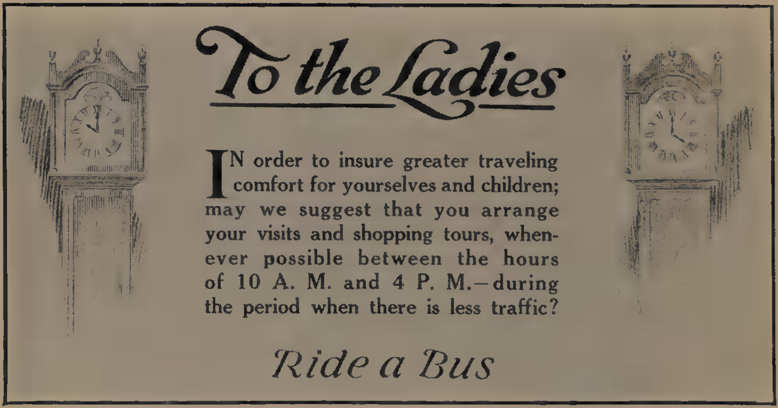


SIGNBOARDS WHICH IMPRESS UPON DRIVERS THE NECESSITY OF "SAFETY FIRST."



Do you know that motor buses may be hired for private use—for outings, conventions, theatre parties, etc.? The rates are reasonable. The driver will gladly give you any information you may desire.

BY MEANS OF THESE CARDS THE PUBLIC CAN BE INFORMED OF FACILITIES FOR SPECIAL TRIPS, ETC.



IN order to insure greater traveling comfort for yourselves and children; may we suggest that you arrange your visits and shopping tours, whenever possible between the hours of 10 A. M. and 4 P. M.—during the period when there is less traffic?

HINTS ON PARTICULAR TOPICS AROUSE THE INTEREST OF THE RIDERS AND HELP TO SELL THE BUS IDEA.

only the name of the employee and the company's trade mark, but the words: "Service, Civility, Loyalty." If each employee lives up to this motto on his badge what more could be asked by the patrons or the operator of the line?

Recognize the Driver's Personality

In buses manned by a single employee who sits behind the wheel and faces toward the front practically all of the time, a badge worn on the breast will not be plainly visible to the patrons. Consequently, it is advisable to place the employee's name badge on his right sleeve in the form of a chevron or lower down on the sleeve as a cuff stripe.

Some lines follow the practice of the successful and larger chain stores by placing a small sign over the windshield on which a personal introduction can be printed. For instance, the sign used by one operating company reads as follows: "This bus is operated by William Brown." The introduction of this personal element breeds good-will, both in the riding public and the employee, for very shortly it will be noted that employee William Brown will be addressed as "Bill" by regular riders.

Nothing has such direct effect on the bus operator's problem of keeping his line sold as adherence to schedule. Lines operating in cities must of course vary their headway according to the fluctuation of the riding population. During the rush hours, when the headway is short, time is particularly valuable to the riders and every attempt must be made to maintain a schedule which will best serve the needs of the travelers. If, during this period, buses packed to capacity are unable to stop to pick up more people waiting on street corners, who as a consequence are obliged to wait some time for the next bus to take them to their destination, these riders will soon become liabilities to the line. The bus running schedule soon becomes a part of the patron's daily routine and any subsequent variations or laxness in schedule will cause very adverse reaction.

Even after the rush hours are over and the routes are operated on longer headways a very definite schedule must be maintained. The type of schedule will of course depend upon the frequency of headway. On a very short headway it is often desirable not to hold the buses to a definite arriving time at the destination terminal or points along the route, or prevent each bus from making the maximum speed after starting on definite schedule from the terminal or origin. However, such operations are, at the present time at least, in the minority and confined principally to the larger cities.

Where schedules involve headways of more than five minutes a tighter schedule is desirable.

Such tight schedule does not only mean that the buses must leave one end of the line at a certain time and arrive at the other end at a corresponding time, but that all intermediate points shall be arrived at and left on the minute. Buses should never be ahead of schedule as by so doing many passengers who rely on regularity of schedule will be lost. Nor should they ever be late, unless delay is caused by unavoidable circumstances. People cannot be expected to wait on street corners for their transportation for very long periods of time. If such delays are experienced repeatedly, they will certainly take steps to ascertain what other forms of conveyance can be used to serve them with greater regularity. The best compliment that has ever been paid to any bus operator was that inhabitants of the territory along his route set their watches by his buses.

As regards interurban lines, adherence to schedule is even more important. As a general rule the patrons of inter-city buses do not reside on the route itself but come from some distance to the point where they can catch the bus. The very fact that the common conception of a bus emphasizes its informality, as against the formality of a railroad train, engenders riding habits, but the effect of this fruitful informality will be entirely offset if the patrons of the line cannot daily depend absolutely on the schedule as advertised by the bus operators.

What Is Civility?

As previously mentioned, courtesy shown by the bus company's employees has much effect on the selling of bus transporation ideas. Assuming that courtesy pays dividends, many bus companies have made the subject "courtesy" the basis for retaining the patronage of those on whom the business depends. One company, in particular, decided that the matter must be carried further, as courtesy on the part of employees was but one end of the string. A strenuous campaign was started and thousands of booklets dwelling on the subject of "Civility" were distributed. They also conducted a contest offering the sum of $1000 in prizes for the best letters on "Civility." The advertising effect was tremendous. During the contest every bus on the line was equipped with a large sign on which the one word, "CIVILITY" appeared. Regardless of the original idea behind this contest, it showed that civility is the governing factor of civilization. Just how far reaching in its effect civility is can be grasped by a perusal of one of the prize-winning answers quoted below.

> CIVILITY—the virtue that oils the wheels of Life, and the absence of which causes the whole machinery to rumble and jar! It makes even toil palatable; it takes the sting out of the word "boss," and raises the worker from a slave to a fellow man.
>
> It is powerful. Used by a tenant, it can make the landlord forget that he is listed among the Pontius Pilates of the World,

and used by the landlord, it can mystify and also frighten the tenant with dread forebodings.

Introduced into the Mack Sennett Comedies it would forever do away with the custard pies, and it frequently encountered in married life, would destroy the Domestic Relations Court.

A sprinkling of it at the meetings of the Board of Estimate would completely change the atmosphere, and a pinch of it stirred into the handling of the Irish question would have settled it five hundred years ago.

Without it, what chance would Cleopatra have had with Caesar or Antony and how far would Antony have got with his funeral oration if he hadn't opened with it. It was the serpent's most powerful weapon in the Garden of Eden, for if Eve was anything like the rest of the sex, that apple could not have been rammed down her throat by force. And if Eve herself had bullied Adam, would he have eaten it?

If ex-Kaiser Wilhelm had had even a little of it, the war would probably not have occurred.

It is powerful enough to kill hate, and charming enough to create love.

It has made the French Nation popular throughout the civilized world, despite a peculiar style in mustaches. It was used so extensively in connection with duels, that delicately nurtured girls could view unmoved, except for an enjoyable moistening of the eyes, the spectacle of a graceful matinee hero inserting six inches of cold steel into the ribs of the best villain on Broadway, even when men were scarce. Realizing its value our modern prize fighters endeavor to duplicate the civility of the ancient duelists by shaking hands—but the effect is not the same; there is something wrong with the hands.

If it were not for the civil manners of toreadors in general —as evidenced by the specimens in Spanish literature and opera, —would not the Spanish people long since have lost interest in a brutal sport? But the good manners of the toreador, opposed to the bad manners of the bull, have won the day. Yes, Civility, like the quality of mercy, increases the power or the charm of "him that gives and him that takes." It is courtly in the lover, and becoming in the beloved; welcome in the husband, and flattering in the wife; dignified in the father, and docile in the child, gracious in the grandmother and adorable in the grandchildren—altogether delightful in friends and associates, and alas, uncommon in our general intercourse.

Let's remember that if we enjoy meeting it in others, they enjoy meeting it in us, and Pass It Along."

Safety—Always Vital

Safety is another point that should not be ignored. Regardless of the fact that wrecks do occur on railroads people must ride on the trains, and even the most timorous must put aside their fears when exigencies compel them to travel. Except in rare cases, however, no such emergencies or important occasions demand that people ride in buses. For this reason the factor of safety is particularly important. In the year 1922, 14,000 people were killed in the United States, and 350,000 were injured, by automobiles or motor trucks. In just how many of these accidents the drivers of the motor vehicles were directly responsible, or just merely involved, is impossible to say. But, regardless of responsibility, in many cities sentiment was aroused to a point where people demanded that something be done immediately to control the situation. Literally thousands of suggestions were made and as many remedies offered for the solution of this problem. In some instances the police were blamed, in others, the drivers, and, in still others, the unfortunates who were the occasion of the aroused sentiment.

It was decided that, regardless of responsibility, a campaign must be inaugurated in which every step possible should be taken which would in any way tend to reduce accidents. The much advertised "Safety Week" campaigns were the result. The ramifications of these campaigns were such that no stone was left unturned. Streets and buildings were plastered with posters. Free training schools were started for drivers of commercial vehicles and an educational plan was put into effect which covered every type of citizen, even the children in the lowest grades in the public schools. That these campaigns were well conceived and carried out is substantiated by the fact that a very noticeable decrease in accidents ensued. In New York City, on one week of 1921, there were seventy accidental deaths. During safety week of 1922 this number was reduced to nine.

Motor bus line operators must see to it that their vehicles are not given the reputation of being unsafe. While the maintenance of frequent and rapid schedules is a requisite of any line, speed at the sacrifice of safety cannot be countenanced. Drivers should be given instructions regarding careful driving and should be forced to be careful. Of what value to a patron is a comfortable seat in a well-ventilated or well-heated vehicle when, through crazy driving, the rider is kept on "pins and needles" all of the time. One scare given a nervous old lady who happens to be a factor in her community, will offset many thousands of dollars' worth of advertising.

Courtesy of the Road

In the past, in particular, drivers of many intercity buses in all parts of the country seemed to have been obsessed with the idea that they were the only ones who had the right to use the highways. Bus operators must understand that on the public highways they have the same rights as, and no more than, the driver of the humblest flivver. They are entitled to the use of half the road and no more. To allow your drivers to be "road-hogs" is not only criminal, but extremely impolitic.

One factor which has prevented many buses from being able to compete with other forms of transportation operating in the same territory is the fact that the buses of the past and many buses used to-day, have no adequate provisions for baggage. The modern type inter-city bus has overcome this objection, but as yet people do not appreciate the fact that within reason the amount of baggage which can be carried is unlimited. Most patrons of inter-city buses do not carry trunks, but when on occasion it is found necessary to travel with a trunk, every effort should be made to see that patrons' baggage is given the same consideration which the railroads give it.

Lines handling baggage in large quantities will often find it to their advantage to maintain a van mounted on a fast bus chassis which can be sent out between terminals at regular intervals. In the majority of cases it will be found that two or three trips a day will suffice as trunks can usually be sent over before their owners leave, but it should be kept in mind that patrons must never be required to wait unduly at terminals for the arrival of their baggage.

CHAPTER VI

Operation

A COMPANY operating motor buses makes money or loses money in accordance with the way its internal affairs are handled. If the selection of the route has been correct, the number of passengers being carried is dependent primarily on weather conditions and other matters to a large extent beyond control of the operator. However, this natural flow of the public to the operator's buses will depend on other factors directly controlled by him. The appearance of the bus, which includes cleanliness within and without, condition of its paint, the type of lighting used and the general design of the body, will all have their effect on originally selling the idea of using the bus to patrons, and influencing their continuation as riders. The speed at which the bus is operated can be so great as to drive away a certain class of rider and be so slow as to destroy the riding habit. The seating arrangement will also have its influence on revenue. If comfortable, roomy seats are so arranged that there is room for standees, they will naturally hold riders who would be disposed to use other possible methods of transportation if the bus riding was made uncomfortable.

Seating arrangements may also slow up schedules if care is not taken to have them so arranged that crowded buses can be loaded and unloaded quickly. These passengers represent the income of the business. The profits are measured by the difference between the income and the expense. The expense, therefore, is as important an item as the income, and consequently, as much effort should be made toward keeping the expense low as in keeping the income high.

In considering operation and operating expenses, there is only one fundamental, and that is to secure the most miles per dollar, consistent with good service. With this as a goal the equipment of the shop for maintaining the vehicles, the handling of drivers, mechanics and other shop men, and all other features that come under operation should be governed accordingly. A satisfactory operation can only exist if the company has competent drivers and adequate equipment. The best equipment in the world could quickly be ruined by careless or incompetent drivers. On the other hand, the most careful and competent drivers are helpless without good equipment. The department of operation falls under two heads: the first has to do with the personnel, and the second with the equipment.

Handling the Personnel

As in other departments, the personnel of the operating department functions best when it believes in the organization for which it is working. In the small organization it is possible by personal contact to keep the employee loyal to the organization and to quickly detect and weed out the inefficient. This becomes more and more difficult as the organization increases in size, but the fundamental principles remain the same.

In this respect, there are two things to consider in the bus driver. One is his relation to the public, which includes not only attention to the passengers in the way of courtesy, etc., but also includes reckless driving that might tend to frighten timid fares. The other is his care of the bus. Any bus operator can tell the difference between a good and a poor bus driver by his effect on the maintenance costs.

The Selection of Drivers

Too much attention cannot be paid to the selection of drivers. Applicants should be carefully investigated as to their past records and personal habits, and no one considered who lacks a pleasing personality. After all, unless there is some bond of sympathy between the employer and the man who is to operate the bus, neither the operator nor the employee will be satisfied, regardless of the ability of either. Only capable men, mentally and physically fit, should be hired to shoulder the responsibility of the lives of the passengers riding in their buses.

Possibility of accidents is always to be considered and grave responsibility rests on the driver. The driver cannot be too careful. One bad accident can bankrupt a good bus line. In the selection of drivers, only men with at least a public school education and ample experience in driving should be considered, unless the operator maintains a training school. It is best to obtain a record of his past five years, the names of previous employers, length of service with each, kind of work done, and the reasons for leaving. As this man handles the money that comes into the business, a check on his honesty is a matter of course. A man should not be taken on in a hurry. His record should be checked up carefully and if it shows him to be of good character, he should be put to work or informed as to about when he will be needed. A few very good men in reserve can be had by making a driver's job one to be desired.

Instructing New Drivers

The best and most reliable driver the company has should put the new man "through his paces" for at least two days. He should drive an empty bus, preferably over the routes over which he is to drive. He should acquire the knack of answering passenger's questions without taking his eyes off the road, while driving. This may seem of minor importance, but the inability to do this causes many accidents.

During the driving instruction or test with one of the line's best drivers, it is necessary that the student be instructed along two general lines. First, ability to drive the bus properly. Second, manner of handling passengers.

It is not sufficient that the instructor conduct this preliminary test and report in general terms what his findings have been. For the protection of the bus line it is desirable that he be required to submit a written report in detail covering certain specified points. To be sure that none of these points are omitted and in order to simplify the entire operation it is a good idea to have a form covering each of the points for consideration on which the instructor can make his notations and ratings.

In general, bus driving involves two things: First, the mechanical manipulation of the controls, and second, the judgment of traffic situations. In respect to the former, the student should naturally be taught the function of each control and the technique of its proper operation. For example, he should acquire a nice judgment of engine speed from the sound of the engine. This is essential to proper and quiet gear shifting. He should be able to tell at what point the engine begins to labor and so adjust the spark advance lever that spark knocking will be avoided, yet at the same time preserving as great a degree of spark advance as possible without knocking. His judgment of the proper instant at which gears should be shifted is essential. This is particularly important in the case of a driver who has graduated from operating a passenger car or taxicab. Due to the greater weight and consequent inertia of a heavy motor bus, the engine is more quickly sensitive to changes in gradient and softness of road surface than the lighter types of vehicle, and for the comfort of the passengers it is far more important that sudden and radical fluctuations in speed be avoided. For this reason the driver should know just how far his bus can go in a given speed, under certain conditions, before it is necessary to shift gears. The tendency is all too prevalent for bus drivers to defer shifting to a lower gear, on ascending a grade, until so much momentum has been lost and the engine speed has been so reduced that the bus is unable to make satisfactory progress, even after the next lower gear has been engaged. In many cases it is necessary to completely revise the driver's notions of economical and effective use of both gearshift and spark control. In this, the student should be strongly impressed with the truth that it is far better to take a hill in a lower gear than to require the motor to labor in a higher gear than will permit smooth engine operation. A laboring engine not only consumes more fuel than it would running easily in a lower gear, but is far more apt to overheat due to the slower circulation of water and slower speed of the fan. Moreover, it is apt to suffer from insufficient lubrication due to the enormously increased pressures on piston rings, pins, connecting rods and main bearings, at the very time when the slow speed of the oil pump is delivering the smallest amount of oil to the bearing surfaces.

Similarly, in the handling of the spark control, many drivers must first get rid of erroneous notions before they can handle motor buses satisfactorily. It is never justfiable to operate a bus in such a manner that the engine knocks. Under these circumstances, a retarded spark will not only save the engine from a considerable amount of stress due to the premature explosions, but it will actually produce more pulling power. Further, in connection with spark knocking, many drivers have to be taught that too sudden opening of the throttle for accelerating, will reduce, rather than increase, the acceleration of the bus, due to the spark knock, which is so apt to result from this practice.

Proper Steering Important

Steering is a function which is very difficult to treat in words, since nice steering is a matter almost entirely of manual skill. It is easy enough to say that the driver should not swerve too rapidly and should endeavor to steer as straight a course as the condition of the pavement and traffic warrants; and that in taking turns he should endeavor to swing the bus around the curve as smoothly as possible. A skillful driver should be able to set his wheel at the proper position on starting a turn and not move it again until straightening out after the turn is completed.

Another requisite to proper steering of a bus, which can only be acquired by experience, is judgment of clearances. Even an ex-driver of a large motor truck is prone to misjudge clearances in driving a bus because of the greater wheel base. This is particularly true in rounding corners where, unless the driver is ever mindful of the long wheel base, he is apt to strike the curb with his rear wheel due to failure to swing out his front wheels far enough. Another point, which requires a great deal of care, particularly where city type buses are used having a considerable overhang past the rear axle, is the outward swing of the rear end of the bus in making turns. The student should be taught to be watchful of the offside rear end of his bus in making turns. One of the most dangerous tendencies of inexperienced drivers of buses when driving through traffic is that of cutting in ahead of overtaken vehicles too quickly. The novice usually leaves a wake of partially ditched cars and trucks behind him. On passing another vehicle traveling in the same direction, the bus should continue in a straight course until its rear end is well clear of the overtaken vehicle before the driver makes any attempt to swing back to the right side of the road. Most buses are equipped with rear vision mirrors which enable the driver to gauge the proper clearance at the rear. All this must be taken into consideration before attempting to pull out and pass another vehicle. A bus will not overtake other vehicles as rapidly as a touring car or taxicab on account of its greater length and its necessarily slower acceleration due to the greater weight.

Good Driving Judgment Necessary

Perhaps one of the most valuable accomplishments of a good bus driver is his ability to see ahead and to judge the character of the road surface at a glance, to estimate instinctively the speed of other vehicles, regardless of their direction of motion, and to have an unerring feeling of momentum.

The driver should be impressed with the need of keeping well over to the right of the road when not passing other vehicles. This is very important for the bus driver who persists in driving in the center of the road prevents faster moving vehicles from passing and the annoyance of being compelled to trail behind a bus is apt to breed illwill toward the bus company.

After the student has been given considerable training in the manipulation of the various controls and road driving, special attention should be paid to the subject of starting the bus from the curb. Particularly during rush periods there are many patrons who are forced to stand and if the driver starts away from the curb with a jerk, much discomfort to the passengers will result. A motor bus is primarily a heavy vehicle and cannot be started from a standstill with the same ease that a light passenger car or taxi can be gotten under way. Drivers of passenger cars are prone to start in second gear, as they have found from experience that the relation between the weight of the vehicle and the power developed by the engine rarely makes the first gear necessary under normal conditions. A bus, however, should always be started in low. When this low gear is in mesh the engine is able to generate its maximum power without undue stresses and strains and can transmit this power smoothly to the driving wheels. If, however, the engine is forced to labor unduly, as it does in instances where a bus is started in second, the resulting strains are reflected in the maintenance cost.

It is just as important that a bus be stopped smoothly as it is to be gotten under way smoothly. The handling of the brakes is comparatively simple and once the instructor has impressed the student with the few fundamentals, such as coasting to a stop when feasible, no further trouble need be anticipated.

The Proper Use of Brakes

Application of the brakes generates heat which must be dissipated into the air. If a bus is on a long downward incline where the continued use of the brakes is necessary, it is quite obvious that when one set only is used the heat generated will soon become more than can be radiated, with the result that the bands will become burned. A skillful driver always manipulates his brakes in such a way that one set is never overworked and the other underworked, but will strike a happy medium. Owing to the fact that a bus in motion represents a great amount of energy which must be dissipated before it can be brought to a stop, and owing to the fact that the heat generated in its brakes is much greater than on a passenger car, the two sets of brakes are isolated from each other so that the heat generated by one set will not be absorbed by the other. This is accomplished by mounting one set on the rear wheels while the other operates on the drive shaft.

The engine can also be used as a brake by shifting to a lower gear. This compression brake acts as an auxiliary to the manual brakes and relieves the brake drums of much of their work. In descending long hills it is always advisable to alternate the brakes. For instance, the foot brake can be used as an auxiliary to the engine brake for a portion of the descent, after which the footbrake can be released and the handbrake engaged. Of course, under very severe conditions it is often necessary to use all the braking mechanisms at the same time, but under such conditions the brakes are usually applied for a short period only and overheating need not necessarily follow.

Pulling Up to Curb

In driving in cities the student should be warned against allowing the tires to come in actual contact with the curb. This is very important, as, continued rubbing will soon wear down the sides of the tires. It is also very difficult to get a long wheel based vehicle away from the curb once the wheels have been allowed to come into close contact. This often results in delays as other cars may draw up and park at the curb in front of the bus during a stop of any duration, and before the bus can get under way these other vehicles must be moved.

Also a student should be instructed to stop at the same relative distance from each corner. In many instances the operators have had stopping signs painted on the pavement and, of course, the advantage derived from such regular stopping and starting points are entirely lost unless the driver is taught to always bring his loading platform as near the line and curb as possible.

Many line operators use buses of several makes. Every bus, or in fact, every motor vehicle varies somewhat in its handling characteristics. Therefore, after the student has become proficient in operating the bus on which he has received his instruction, he should be allowed to make trial runs on each of the other types in order that he may become familiar with their individual peculiarities.

It must not be forgotten that the bus owners' driver is the representative who comes into contact with the public, and as such, is the salesman for the bus company.

His attitude toward the public will reflect the company's policies, so it is important that the driver be given instructions in the proper handling of customers as well as the method of handling his bus.

Driver Equipment

Every economical device that will expedite the handling of passengers should be used. For instance, where cash fares are taken, the driver should be supplied with a change maker to enable him to give the proper amount of change as quickly as possible. If tickets are used a rack should be placed within easy reach of the driver so that tickets can be readily torn off or easily punched, as the case may be. Not only does it please the customer to be attended to quickly, but schedules are improved if the driver is able to complete his job of fare collecting with dispatch and turn his attention to operating the bus without needless delay. This also promotes safety, for the driver loses no time in giving his sole attention to driving.

Knowledge of Route

After these first tests have been passed, his name should be put on the Student or Reserve List. Before a driver is put on for regular work, there is certain information he should have at his finger tips for his riders. For one thing he should know the intersecting streets on the routes over which he will be called upon to operate. He must learn connections which can be made from the bus line to any other transportation lines. He should also know the important points of interest, such as the leading hotels, theatres, etc., adjacent to his route. When an extra driver is needed, the first man on the list should be called in to take the run. In this way emergencies, such as a regular driver's day off or the illness of a driver, can be taken care of. This is old practice in street car operation, and works out very satisfactorily.

After a man has had this instruction, the supervisor will know whether or not he should be placed ahead of someone who may have been on the list longer. It is not always possible in a large bus operation to avoid seniority. On a small bus operation it is, and often works out very well. In this latter way, a regular run goes to a man on the reserve list with the best record, which, after all, is the main desire of the operator. Men on this work are paid by the hour at the rate prevailing in whatever community the operation is located.

Uniforms and Supplies

A deal can be made with a local tailor for uniforms at about $25 a uniform. These can be paid for by deducting a certain amount each week from the salary of the driver. About two uniforms a year will be required.

When the operator is running a line that he does not feel will justify the outlay of a uniform, and considerable driving is done in the summer time when the driver removes his coat, some degree of uniformity can be obtained by instructing the drivers to report for work wearing khaki shirts and black neckties. This throws very little burden of expense on the drivers. In fact, these shirts are cheaper to wear than the multi-colored shirt with white collar that is the usual practice. Numbered badges for employees can be bought locally. These are usually put on a driver's cap. One company puts the badge on the back of the cap so that the passengers can see the number.

As schedules are most important in a bus line, a good watch is necessary. The schedules are usually made out on a card to hang to the left of the driver and if this schedule is placed in an envelope with a celluloid front, the watch can be slipped in with the card which will enable the driver to compare in an instant the time on the watch and the time on the schedule at any given point. Drivers should be instructed to set their watches with the garage clock before going out on a route so that all of the operation will be run on the same time. The driver should have a 5-barrel money changer. Care should be taken in purchasing money changers to see that they are so set to give the amount of change most frequently needed. For instance, if the fare is eight cents, the penny barrel of the changer should be set to deliver two cents, unless, of course, the coin box is also used where the customer deposits his own fare. In such cases, the money changer is set to deliver the full amount of change. The driver should also be supplied with sufficient change and if tickets or tokens are sold an adequate number should be given him. The amount of money given to the driver will depend on how frequently he passes his garage and on how long his run is. This must be determined by the operator who should see, however, that the change is sufficient to at no time inconvenience the passengers. It is the usual practice to charge the driver a deposit of $7.50 to insure the safe return of the money changer, which usually costs $6. The driver must also be equipped with a small canvas or leather money bag for use in turning in the cash collected during the day's run. The office must have blanks for trip reports which the driver fills out at the end of the day's run and turns in.

Accident Blanks

Each driver should have accident blanks in order that he may quickly fill in, in case of an accident, all the information the insurance company requires. The agent handling the company's insurance can furnish these blanks. Complete and accurate reports on accidents usually means quick settlement, with corresponding reduction in premium rates on liability insurance policies.

Fare collection should be made as simple as possible. Metal or paper tickets can be used. The prepayment plan is the system most frequently used, but in cities it is often advisable to use the Pay-As-You-Enter Plan for buses traveling in one direction and the Pay-As-You-Leave plan in the other. In order not in inconvenience the passengers a sign should be placed near the door where it can be readily seen, reading either "Pay-As-You-Enter" or "Pay-As-You-Leave." The Pay-As-You-Enter plan should be used where passengers are picked up a few at a time and are usually delivered at the terminal of the route or at any point en route where they are apt to leave in numbers. The Pay-As-You-Leave plan best serves its purpose when the reverse is true. For example, where the bus leaves the center of the city during the peak hours no time is lost in getting under way if passengers can proceed directly to their seats and pay as they reach their various destination points.

Keeping Tabs on Dead Heads

Some lines keep a record of dead-heads such as firemen, policemen and company employees, but this information is of no particular value after it is recorded. The driver, on his trip report, states the number of fares divided among cash and tickets, the number of books or the number of tickets sold. Only enough information to check the money and tickets sold and collected is necessary on a report of this kind. Elaborate reports can be made up, but the general experience is that the simpler the report the better.

Tickets of different color have been used with quite a little success on some long runs, various colors being used for each station. This tends to eliminate a chance for manipulation of tickets. A daily record of trip receipts gives indication of travel. One method of checking receipts is to rotate drivers; making one man operate on one route one week and on another route the next.

Wherever possible the same driver should be kept on the same bus as this will eliminate a lot of alibis on maintenance of buses and friction between men. Drivers are likely to blame any mechanical trouble on the man who drove the bus last.

The driver's pay is a subject over which there is a great deal of discussion. Some companies pay a straight salary to drivers. Some pay by the mile, and some pay salaries plus a bonus. In the long run, the driver is worth so much, and whether the operator is satisfied with a man and his ability, or whether he wants to keep daily check on the driver's record, is a matter of personal choice. Listed below are the factors taken into consideration by one bus company in fixing the bonus:

Accidents due to carelessness.
Failure to stop at a railroad crossing.
Failure to observe traffic laws.
Speeding.
Starting before the doors are closed.
Opening doors before bus stops.
Failure to report accidents.
Giving out incorrect information.
Failure to observe road courtesy.
Inattention to destination signs.
Failure to turn in lost articles promptly.
Dirty buses.
Missing a run or reporting late.
Three minutes fast or slow on schedule.
Leaving bus unprotected.
Smoking on vehicles.
Spitting out of windows.
Reading on duty.
Failure to report mechanical defects.
Running on flat tire.
Racing the motor.
Improper use of brakes.
Failure to use all shifts in starting.
Failure to collect fares.
Failure to obey company rules.

Some list of this kind should be kept by every bus operator whether or not he uses the bonus system. In general, it covers the items that tend to make the operation satisfactory. On violating rules, a fine of so much money is charged against the driver's salary or possible bonus. A definite limit should always be fixed when operating under this rule and after that limit is fixed, an average for each desirable quality in a driver should be given a cash value.

Many operators will have additions to this list, but unquestionably: insolence, discourtesy, dishonesty, collisions and maltreatment of the bus should suffer the greatest penalty.

Some operators are having difficulty in handling their organization. This is particularly true in the larger bus operating companies. The difficulty is the result of the operating department hiring and discharging drivers without the maintenance department having anything to say about their discipline. A situation like this rarely occurs in a small operation, but in a larger operation confusion and severe losses will be avoided by having the man in charge of the drivers equally responsible for the operation and maintenance of the bus. To explain this, in some instances a driver will be running up the cost in the shop on his bus, and when the shop foreman complains, he is met with the statement from the operating department that the driver is honest and courteous and therefore is a good driver as far as the operation of the bus is concerned. Discipline can never be maintained this way, and a driver will often take advantage of such a situation.

How a Large Company Handles Drivers

How deeply into the subject one large and successful organization has gone in the proper handling of drivers can be appreciated by their methods outlined as follows:

1. Rigorous selection of men.
2. Proper training.
3. Constant supervision.
4. Good wages.
5. Driver vehicle inspection.
6. Same vehicle to each driver each day.
7. Contests for vehicle performance and courtesy.
8. Promotion with raises in pay from within the ranks.
9. Annual vacation with pay.
10. Personal contact.
11. Maintenance of welfare department.
12. Uniformed drivers.
13. Monthly house organ publication.
14. Award of service insignia.
15. Frequent smokers and get-togethers.

With a driver turnover of only 5 to 10 per cent per year, and with an accident record of responsibility for only one fatality for the 10,946,969 miles traveled between January 1 and November 13, 1923, during which 48,969,031 passengers were carried, this company has what is perhaps the highest driver efficiency of any motor transportation company in the country.

Selecting the Drivers

How this company obtains this high degree of driver efficiency is a subject which should interest every bus operator. Reducing labor turnover and securing better vehicle performance in the hands of capable drivers, are two problems which, when satisfactorily solved, go far to reduce total operating costs.

The superintendent of transportation of this organization believes that a large share of the problem is solved when the right men have been chosen. "As ye sow, so shall ye reap," is a Biblical proverb which applies to choosing men as well as to selecting good seed. The right man under favorable working conditions will do efficient work, just as a plant bears good fruit when it springs from healthy seed, flourishing in fertile soil.

1. As a result of the rigorous selective tests of the company, only one out of every five applicants is ac-

cepted. So important are the responsibilities of bus drivers in heavy traffic that to reach this position requires qualifications almost as high as Uncle Sam demands of our air mail pilots.

What Makes a Good Driver

These are the qualities which the applicant must possess:

Good character.
Even temperament.
Intelligence.
Sound physique.
U. S. citizenship.
Responsiveness to discipline.

Good character is determined by investigating the applicant's life history. A previous record of honesty and faithfulness insures the continued exercise of these traits.

On the theory that "birds of a feather flock together," the company accepts many friends of its present drivers who have proven their worth. The fact that employees already in the service are anxious to recommend their friends is an added testimony of their satisfaction with their employment. Taking on friends of employees will also aid their feeling of good will toward the company.

Even temperament is a quality which is best determined by the physical examination, in conjunction with practical road tests under operating conditions. Satisfactory performance is the best test, so that a man's ability to keep his head in emergencies is brought out during his trial period rather than at the time he makes out his application.

An applicant's intelligence is determined more by his general appearance, manner of answering verbal and written questions, and ability to fill out required forms, than by any specific psychological tests or record of schooling.

Normal weight in proportion to height is a requirement in connection with the physical examination. No applicant under 5 ft. 7 in. is considered. In addition to a thorough physical examination, particular stress is laid upon good hearing and excellent eyesight. The tests for vision include reading a chart at a specified distance, and distinguishing between various colored lights.

Another requirement is that the applicant must be a United States citizen and at least 25 years old. Married men are preferred to single men, and army or navy training is in their favor.

Patriotic reasons alone do not account for the preference given to men with army or navy training, other things being equal. Strict discipline is as necessary to an efficient transportation organization as it is to a military machine. Men who have served in the army or navy in time of war realize this, and are more responsive to constituted authority.

The Training School

Up to this point the reader may have remarked that no mention has been made of previous driving experience. Often that is the only criterion which employment managers have for selection of men for any kind of work. It is no doubt true that men with previous successful experience in a particular line of work will do that work better than a green hand. But first one must make sure that the previous experience has been along the line of work which will be required. In fact, so insistent is one company on this point that only previous experience in this company's organization counts in the applicant's favor. It is even declared that the man with no previous driving experience whatever makes the best driver after he has gone through the company's 21-day training school.

The prospective driver is not sent to this school, however, until he has worked from five to six months as a conductor. If he has established a good record for accuracy, courtesy, honesty and faithfulness during this six months' period he is given the chance to become a driver.

Every company driver is developed in the training school, no matter what previous driving experience he has had.

> First week, he cranks buses.
> Second week, he receives mechanical instruction.
> Third week, he gets practical driving instruction.

Men not only proficient as drivers themselves, but also having a knack for teaching others, are retained as instructors.

After the three weeks of training, the candidate comes up before the State Commission for his chauffeur's license. Even after obtaining that he does not receive a driver's position with the company; he operates a bus for a week under expert supervision. And until a man is old in the service he is continuously watched by company supervisors, who board the bus along the route, and check up the driver's performance.

In addition to this, one motorcycle supervisor in uniform constantly patrols the routes covered. Twenty operatives, or "plain clothes men" also check up on the drivers and conductors by boarding the buses as passengers.

Good Wages Paid.

Wages are fixed by dealing directly with the men. The average chauffeur's wage is $45 for a six-day week, including his pay for overtime. The present wage scale for drivers is 69 cents an hour for the first year's service, 70 cents for the second year, 73 cents for the third year, 74 cents for the fourth year, and for the fifth and succeeding years 75 cents an hour.

The number of hours each man works depends upon his choice of route, which varies from seven to ten hours.

He is allowed ten minutes at the time he begins work and ten minutes at the close to check up his bus in regard to lubrication and needed repairs and adjustments.

Each man takes a personal pride in the performance of his bus, because it is under his care all the time. He makes only minor repairs on the road, and none in the shop, but he must see that these are done promptly, when needed. He shares this responsibility with another driver who has the bus on the second shift, and between them they vie with the other drivers to obtain the maximum gasoline mileage and lowest maintenance costs. Distinctive colored flags are carried on the buses having the best records for highest gasoline mileage.

Contests are held from time to time to promote courtesy and safety on the part of the drivers and conductors. The men are entrusted with human lives, and these passengers constitute an ever-present jury for their actions.

Raises in pay are on the basis of seniority within the same grade, and promotion with raises are made chiefly according to merit, seniority being considered. Vacancies to higher positions are filled from the ranks whenever possible.

No direct bonus plans are in effect, but the company has recently announced an annual vacation policy for conductors and drivers. Under this plan every person who has been in the service of the company for one year or longer is eligible to receive a vacation of one week each year with full pay at his regular rate, providing he had worked regularly and efficiently during the preceding year. This policy is considered to be an innovation for transportation companies.

Personal contact is at all times sought between the officials and men. The company believes that when the men are treated as individuals, and not merely as pay roll numbers, they will respond much better to their work. To carry out this policy, each driver wears a name plate instead of a number and in all his relations with the company and the public he is known by his individual name. This removes the stigma of depersonalization of the worker, a charge brought against so many industries.

Welfare Work

For the benefit of the drivers and other members of the organization, the company maintains as part of its welfare department:

a—Physician and nurse, with a fully-equipped physician's office and operating room. The physician and nurse are at the disposal of all employees of the company and their families.
b—Modern restaurants, which supply clean, wholesome food at practically cost prices, in each of the two garages. These restaurants are exclusively for employees.
c—Cheerful club-rooms in each of the two garages, where music, good books, billiards, chess, checkers, etc., may be enjoyed by the men during leisure moments.
d—An up-to-date barber shop in each garage.
e—A fully equipped tailor shop.
f—A chiropodist.
g—An association of employees, which provides for the payment of stated sums in the event of sickness, disability or death.

Drivers are required to be in uniform while on duty, the same as conductors and other men in the transportation department. The company supplies the driver with a coat and pair of breeches free of charge, and he must personally buy the other articles. A company uniform contributes toward a group feeling among the employees, each one of whom thus identifies himself as a member of the big family.

Another means used to promote this *esprit de corps* is a house organ which is published monthly. The purpose of this publication is well set forth in this declaration of the company. "The little magazine, which has become so much a part of the life of the company, was inaugurated with the express purpose of amusing, entertaining and informing all the employees about what was going on within the organization. It was a move to draw together the several departments, to unite the company into a family with everyone knowing about, and being interested in, everyone else who belonged."

In the magazine, personal items about each employee form the largest part of the reading matter. Special mention is given to men who have been long in the service of the company, or who have otherwise distinguished themselves. Special issues are circulated when the annual presentation of service insignia takes place.

Service insignia are awarded according to the number of years in the company's employ as follows:

1. One to five years, Bronze.
2. Six to ten years, Silver.
3. Eleven to twenty, Gold.
4. After twenty years, Gold with diamond.

Annual company dinners, picnics, frequent smokers, and get-togethers are other means of maintaining cordial relations with the employees.

The elaborate scheme detailed above for the handling of drivers could not of course be utilized in all its details by a smaller organization, nevertheless the principles apply, regardless of the size of the operating company or the number of buses employed. There is a tendency among some of the smaller bus companies to over-work the drivers. The run should be such that the drivers are not on duty an unduly long period. No man can work efficiently nine hours without some break for food and refreshments. In other words, in arranging the schedule, the driver should be taken into consideration as well as the public.

The idea of a bonus for the drivers is often a good one, no matter whether the bus company is large or small. The bonus can be worked out in a great many ways, but it should include, in cases where the buses are one-man operated, credits for efficient operation of the vehicle and credits for service as a conductor, particularly in respect to courtesy, accuracy and appearance. In mentioning appearance, it should be remembered that passengers judge the service by the appearance of the drivers as well as by the appearance of the vehicles. People will not ride in buses unless they have confidence in the driver, and slovenliness in the appearance of the driver does not inspire confidence.

Inspection and Maintenance

Eternal vigilance is the price of low cost maintenance. No maintenance is good unless it is systematic, because important items are sure to be overlooked. In the organization of the system, it is necessary that the buildings, equipment, men and management are all combined to produce one result, namely, keeping the fleet in running order at the minimum cost. Inspection must be daily, and at the end of stated intervals, say at 3000 miles, a more thorough inspection should be made. If the fleet is of fair size, a competent staff of men should be maintained for this purpose, and a complete record kept of their findings. A very good instance of how one trolley company operated a thirty-one bus fleet economically, is as follows:

A total of 77,806.57 bus-hours was operated at an average route speed of 10.9 m.p.h. For the first part of the year buses were in service on an average of 9.28 hours per day, while for the latter part of the year, in order to supply additional service, an average of 11.2 hours per day was maintained.

The bus department is located in a new and modern fireproof building, with a frontage of 88½ ft. and a depth of 249 ft. This building has a two-story office, supply and transportation room at one end, and the bus shed, 218 by 88½ ft. in dimension occupies the remaining space.

Shop Equipment

Except for a 31-foot depth across the front of the building, the entire ground floor is used for storing buses. Twenty-five buses can be parked along each longitudinal wall, leaving a wide aisle in the center for maneuvering. The space at the front of the building, which is divided in the center by a front driveway, provides two rooms; the one on the left is the repair shop and the other on the right is the superintendent's office and supply room.

The repair shop is equipped with:

30-in. swing gap lathe.
Motor driven valve grinder.
Riveter for brake and clutch liners.
10-ton press.
Air compressor.
Drill press.
Engine and axle stand.

A full stock of repair parts and units, including spare engines and tires, is carried in the supply room, the total investment of which being more than $19,000.

Upstairs is located the private offices and a transportation room which also serves as a recreation room for employees.

The building is steam heated by heating coils extending along the walls above the height of the buses, in order to avoid any damage caused by having a bus backed against them. Oil is used for fuel.

A 10-000 gal. tank, buried beneath the floor level near the supply room, convenient to the usual filling and measuring equipment, stores gasoline for the entire fleet.

In this building seventeen mechanics take care of the entire fleet, except for re-painting jobs and tire repair work. For other duties connected with bus operation and maintenance, are:

One night foreman.
Stockroom clerk.
Building janitor.
Shop foreman.
Transportation foreman.
Nine starters.
Forty-one drivers.

In addition to daily inspection, there is a thorough inspection every 3000 miles. Both day and night forces are employed to handle this work.

Complete Record System

As in the case of many successful bus companies, the Providence company insists upon prompt attention to even the smallest defects. Slight defects that do not seriously interfere with operation are reported either at the end of the run or at the end of the day on a special driver's report card carried on the bus. Space for description of the defect, and a code for indicating troubles is printed on the card. On the back is printed a form for entering delays, giving the time when the trouble occurred, amount of time lost, and the nature of the repair or adjustment.

In case of more serious trouble, the driver immediately telephones to the garage for instructions. Tire changes are made by having a service car meet the bus at the end of its run. This can be done, as the bus is able to proceed on one of its dual rear tires, should the other one be deflated. In following out this system, the least worn tires are always placed on the front wheels, so that the liability of delays due to punctures is lessened.

When a trouble report is phoned to the garage, the clerk immediately enters it on a form, "Daily Report of Delays," and from this the road mechanic receives his instructions on the form "Road Trouble Report."

Accident Reports

In case of accidents, bus drivers fill out the "Accident Report Bus Operation" blank on the spot, and turn it in to the office at the end of the day. If the accident is a serious one, the driver immediately telephones the details to the office. If the accident has been a collision he is asked to get the names of as many witnesses as possible, and to obtain the license number of the other vehicle.

The diagram printed on the back of the accident report facilitates entering an adequate description of the manner of the accident, in case of collision. There is also space for the driver to describe the accident in his own words.

Handling Supplies

The system for handling supplies starts with the purchase requisition.

For stockroom parts two forms are used: material requisition to make withdrawals, and a storeroom card on which a perpetual inventory of stock is kept.

Gasoline and Oil Supplies

Gasoline and lubricating oils are recorded separately on the reports. On the daily gasoline and oil report is given the fuel, or oil, charged to, or used, by each bus. It also has spaces for the average number of miles per gallon for each vehicle, these being calculated and filled in by the clerk at the garage. A weekly record of gasoline issued is prepared from the daily reports. A line is used for each day to show the stock of gasoline on hand, the total issued, and the amount to each type of vehicle maintained. A place is provided for any errors between the total issued and the amount which should be on hand, according to the record.

Except that the figures represent quarts instead of gallons, oil issues are recorded in the same manner.

At the bottom of the oil issue form is a space for entering the average bus mileage per gallon.

The tire record consists of a small card made out for each tire as purchased. This record shows where each tire has been used and the mileage covered. The total mileage received from a given tire and reasons for its removal are recorded. All tire repair work is done on a monthly contract basis with an outside concern.

A review of typical equipment in the shops of fleet owners gives a very good idea of what the bus operator needs in the shop. The following is a result of a study made among owners of all types of fleets, including buses on heavy chassis down to small fleets of Fords. It gives a list of what successful fleet operators are using to handle repairs. Examples other than buses are cited, as their maintenance problems are closely parallel.

Unfortunately the newness of the motor bus as a part of organized transportation has prevented the compilation of many figures on the subject of shop and garage equipment. However, many valuable lessons can be drawn from the experiences of truck fleet operators. Recently a canvass was made of 148 operators of three and four truck fleets. Information was requested as to what shop and garage equipment they found necessary for efficient operation. The following list is based on the replies of these operators. By way of explanation it will be noted that 81 per cent, or 120 of the 148, have equipped their garage with oil storage tanks while only 16 per cent, or 14 out of the 148, have installed welding outfits.

Fleets of 3 to 4 Trucks

	Per cent
Gasoline storage tank	72
Oil storage tank	81
Vulcanizers	18
Air compressors for tires	25
Welding outfit	16
Electric drills	29
Engine repair stand	22
Small power drill press	31
Small lathe	18

While the equipment in the private service station of the small bus operator is not extensive, the equipment increases with the number of buses operated. For example, a fleet of twenty-one vehicles in one of our medium sized cities, has the following equipment in the service station for its maintenance. This equipment is valued at $3000.

Fleet of 21 Vehicles

1 Air Compressor—portable—7 cu. ft. per minute.
1 20-in drill press.
1 Portable oil tank.
1 Double wheel emery grinder.
1 Electric drill.
1 Electric Valve grinder.
1 Wheel puller.
1 Acetylene soldering iron and torch.
1 Engine stand.
2 Jacks.
2 Cranes—5000 lbs. capacity.
1 Gasoline measuring pump.
1 Heavy duty sewing machine.
1 Time clock used by drivers and mechanics.

The equipment of the service station varies according to the type of work done in the service station. Some service stations do all the electrical work on starting, lighting and ignition apparatus, whereas others turn this work over to electric service stations. Some do their own engine overhauling and repairing of bodies, repainting, etc., whereas others do not. The following equipment for a fleet of forty-four trucks and sixty-four runabouts, mostly Fords, shows a step-up in service station equipment.

Equipment of Forty-four Trucks, Sixty-four Runabouts

1 Lathe.
1 Drill press.
1 20-in. arbor press.
1 Grinder—emery.
2 Oil tanks (portable and fixed).
1 Compressor (electric).
2 Sets block and tackle.
4 Waste bins.
1 Portable crane.
2 Tire presses.
1 10,000-gallon fuel tank.
1 2000-gallon kerosene tank.
1 Power hack saw.
1 Bench arbor press.
4 Heavy-duty wheel jacks.
2 Engine stands (Ford).
1 Engine stand (Universal).
1 Electric drill.
1 Tire vulcanizing set.
1 Sewing machine for cushions and tops.
1 Acetylene welding set, with cutting torch.
1 Blacksmith's forge and anvil.

Purchasing Parts and Supplies

The purchase of parts, supplies, and materials should be on a scientific and economical basis. If the fleet is large, and the maintenance completely handled in the bus operator's shop, an executive who functions as a purchasing agent will be necessary. No matter what the size of the fleet, the purchasing should be centralized and put in the hands of an executive whose integrity is undoubted, and better, one who has an interest in the business. Materials which can be purchased on specifications should be bought in no other way.

A good purchasing agent, who is thoroughly posted on the materials he is buying, will buy oils, for example, strictly upon specifications, and will check these specifications by either installing testing apparatus or by sending samples of the oil to a laboratory from time to time. The proper specifications, or at least the names and grades of recommended oils, can be secured from the chief engineers of the bus manufacturers. No deviation from these oils should be permitted, as the life of the vehicle is so closely related to the efficiency of its lubricants that the bus operator cannot afford to take chances.

The Bus Operators' Discount

Discounts given by jobbers to the large bus operator have no set standard, but are approximately the same discounts as given to the dealer. Eighty per cent of the jobbers canvassed regarding discounts to bus operators quoted this figure.

There are a few lines in which the bus operator gets considerably higher discounts than the dealer, notably where the operator has a large fleet and he purchases in large ,quantities from the jobber, or frequently under yearly contracts direct from the manufacturer. The operator is generally one of the largest and most stable business corporations in the community.

They are quantity buyers in their own line of business and it is only natural that they should apply the same principles of purchasing to their motor transport departments. In the early days of the bus this was not done, as the fleets were purchased on a somewhat experimental basis. Not only are these fleet owners wholesale purchasers, but they are generally shrewd buyers, and very frequently make their purchases by yearly contracts.

Many fleet owners purchase tires direct from the manufacturer, a few purchasing in volume lots, others in smaller quantities and others buying on a mileage basis.

Some fleet owners purchase spark plugs, brake lining, and ignition cable from their jobbers, whereas others purchase these items direct from manufacturers.

Such replacement parts as bearings, piston rings, water hose, paints, and service equipment are frequently purchased direct from the maker.

Fuels and lubricants are generally purchased direct, although here there is no set rule.

Discounts on lubricants are generally based on the number of barrels purchased per year.

Maintaining the Appearance

One of the most important items of bus maintenance is appearance. No one likes to ride in a disreputable looking vehicle whether it is public or private. If two lines were being operated over the same route, one freshly painted and finely kept-up, and the other with buses which were mechanically just as good but which in appearance were shabby, the buses of good appearance would get the business. Realizing this fact, bus operators should see that the buses are clean when they go out in the morning.

Washing

The matter of bus washing is very important and can run into considerable expense if not well handled and planned. It can be brought to a state of high efficiency as may be seen from the fact that the London General Omnibus Company is washing 4000 buses every night at the rate of four minutes per bus. Two men work on each bus. The machines used in each of the thirty-three garages maintained by this company are all of a standard type.

The washing machines are grouped in sets of three or a smaller number according to the lay-out and capacity of the garage. A washing unit consists of a light steel framework at each side of a curbed and drained gangway on which the bus is taken by the driver before he reports and signs off. Attached to the framework are three horizontal spray tubes at each side; all are drilled with hundred of 1/16 in. spray holes through which water squirts on the bus at the pressure in the mains, viz.: 50-60 lb. per sq. in.

The lowest of the three spray tubes is a fixture having holes drilled to send out streams at various angles in order to deliver it to the wheels, under the fenders and to other parts approximately on the same level. The other two tubes are on projecting arms that are pivoted on the side framing and counterweighted. In these the holes are drilled at one angle only, but by means of hand levers, enabling the tubes to be moved up or down, the sprays can be delivered over the whole height of the body sides above the wheels. These two tubes only extend along the length of the body, for the engine hood is not sprayed directly.

Above the center of the body another spray tube runs from front to back, delivering jets of water at various angles to the upper deck; the purpose of this is twofold, viz., to wash off mud in wet weather and to soak the floorboards to prevent the gaping of the joints and the cracking of the boards in hot and dry weather.

One man operates the spray tubes at each side and uses one of various designs of brushes to remove the soaked mud from wheels, axles, body panels, etc. He dips the brushes into concrete troughs at ground level between the side framing and the bus, these troughs being kept filled with water from the lowest spray tube. The water supply to the pivoted tubes is turned on or cut off by a hand lever, but the counterweights permit the tube to remain in any position while the operator attends to the other tubes or uses his brushes. His brushes have handles long enough to enable the man to stand outside the framing while using them.

The engine hood, cowl and tops of front fenders are brushed without sprays after the sides and back have been done. The engine is kept running while washing is in progress, so that the bus can be moved forward a couple of feet just before completion to enable the lower parts of the wheel rims and spokes to be attended to. Meanwhile the radiator is filled up with water from a flexible hose.

No attempt is made to dry off any part while the bus is on the washing rack, for it remains there from three to five minutes only, the actual time depending on its condition upon arrival.

As soon as it is washed a garage driver moves it to its station for the night and there it is allowed to drain until all or most of the buses are in for the night and have been washed. Then the washers turn their attention to drying-off windows and panels that remain wet and to the polishing of all the windows. The floors are swept out before the washing, while the fuel tank is being replenished at a gasoline station just inside the entrance to the garage.

Layout Must be Efficient

Garage layout is an important factor in washing efficiency. When it is necessary to perform this operation at night, the work must be accomplished while the buses are parked along the walls. The garage should be laid out for proper drainage to prevent the oil and dirt washed off the buses from settling on the floor in puddles.

The ideal situation is where the bus can be washed where they stand. A number of companies have installed what are called washing bays, each provided with overhead as well as side water sprays. The overhead spray consists of a swiveled arrangement to which is attached a hose long enough to spray either top or sides of the bus. The side spray is low enough to be used on the under portions of the bus. Buses that come in early are immediately placed in the washing bay, washed and dried and then run to their respective parking spaces. Buses coming in later are parked and then run to the washing bay during the night. Where buses come in with their lower portions covered with caked mud or road oil, it is advisable to have special sprayers operated by compressed air in combination with a tank filled with a mixture of kerosene and water or some other cutting mixtures. The compressed air at the top of the tank gives a stream of water that is strong enough to break down the caked mud in a short time, and at the same time reach inaccessible places around the chassis.

It is important that the washing racks have plenty of illumination. At the $200,000 bus terminal of the Cleveland-Akron Bus Company, is a battery of twenty-four lights so arranged as to illuminate the top, sides and undersides of the buses while they are being cleaned. This wash rack has high-pressure spray nozzles set in the concrete floor for washing the sides and the chassis, and hoses for the upper portions. These are fed from mixing valves which regulate the temperature of the water. For the removal of grease, compressed air lines are installed to be used with kerosene sprays, and there is a large motor-driven fan for drying the vehicles after washing.

Painting

A typical system recommended by one of the paint and varnish manufacturers allows for a schedule of approximately one week, and involves an expenditure of around $25 for material. Either a metal, wood or composite body is suitable for this work and the system is intended for use where high speed plus low cost is the most important factor to be considered. The number of surfacer and rubbing coats may be varied, if desired, to meet differing conditions of surface or fullness of finish. The seven-day schedule works out as follows:

1st day—Apply an even coat of primer carefully brushed out.

2nd day—A.M. Apply a coat of sanding surfacer, either knifed on, brushed on and then knifed smooth after it has begun to set.

2nd day—P.M. Apply second coat of sanding surfacer brushed on in a smooth full coat.

3rd day—Cut down the surfacer carefully, using flat No. 1 sandpaper and then polishing off with No. 0 or 00 sandpaper to a smooth uniform surface. Dust off and apply a light, even coat of sealer. Brush out well to avoid excess of material.

4th day—A.M. Moss off with curled hair any glossy spots appearing on the sealer and apply a coat of groundwork.

4th day—P.M. Apply coat of color varnish or a color varnish made in the shop using clear rubbing varnish and Japan color of the desired shade.

5th day—P.M. Rub lightly with either pumice flour and water or with oil sandpaper, wash and dry and then flow on a second coat of color varnish.

6th day—P.M. Rub carefully with a felt pad, pumice flour and water to a smooth even surface.

7th day—Clean off carefully and wipe with a "tack-rag" and flow on a full even coat of finishing varnish.

Suggested Paint Shop Equipment

The painting department should be well heated with a dependable heating system. Stoves or gas heaters may throw off fumes at night, which are injurious to wet varnish. A stove of any kind in the finishing-room is a mistake. Steam or hot-water heating is the best system for the paint room. The temperature in the paint room should never be allowed to drop below 70 degrees within six or eight hours after a coat of varnish has been applied. The heating system must be sufficiently good to provide against this.

Facilities for moving the heavy body conveniently and rapidly are necessary in a paint shop. Also, proper storage room for all accessories should be provided.

Every paint shop should be supplied with paint-presses, brush keepers, strainers, and brushes of the desired kind in perfect condition.

Another question to be considered is whether or not to install a compressed air or spraying method for application. This system need only be considered where the volume of work may be great. By this method the paint or varnish is sprayed through a suitable nozzle, or pistol, by means of compressed air. For varnishing or painting small surfaces, the pistol is provided with a receptacle for the varnish, pigment, or paint, which fits on to the pistol itself. For large areas it is necessary to use another type or adaptation of the pistol, in which the receptacle is replaced by a flexible type supplying the liquid to be sprayed from a large reservoir, pressure being used to force the liquid up.

By the use of the spraying method the amount of varnish or paint required per square yard is only a little over one-half of that used by the brush method; moreover, it is considerably more uniform and the operation takes place in only from one-third to one-half of the time.

Approximate Cost of Painting a Typical Bus

½ gal. of sanding surfacer	$1.75
5 lb. of green (in Japan)	3.25
1 lb. of brilliant yellow (in Japan)	.60
1 gal. of motor rubbing varnish	4.75
1 gal. of finishing varnish	5.00
1 gal. of green color	3.75
1 gal. of red color	4.75
1 gal. of paint remover	1.75
1 gal. of topside black paint	1.80
1 pint of aluminum paint	1.00
10 lb. of oil paint	2.50
1 lb. of flat coach black (in Japan)	.45
1 2-oz. tube of flake white (in Japan)	.15
Steel wool, sand paper and depreciation on brushes	2.00
Labor	64.80
Total	$98.30

The above figures cover the bare cost for materials and labor and do not include such items as overhead of building and equipment, supervision, profit, etc. The bus operator accordingly cannot expect to secure a price as low as this from an outside painting concern.

Paint and varnish companies will be found ready at all times to render expert advice to bus operators who maintain painting departments. Many of these concerns employ traveling experts whose services, rendered gratis, will aid materially in solving painting problems.

Overhauling and Renewals

It is granted that repairing is the principal object of a maintenance shop, although overhauling, which is quite different, is one of its most important functions. The distinction between repairing and overhauling is this: Repairing is the correction of troubles arising from the breakdown of parts of the vehicle. Replacing a broken spring, regrinding the valves or putting in new panes of glass are repairs. Overhauling, on the other hand is the general rehabilitation of the bus at more or less stated intervals to recondition all of the parts which are subject to material deterioration by reason of normal wear and tear. Overhauling consists of such operations as re-bushing the steering gear, re-facing of the clutch and regrinding cylinders and fitting new pistons and rings. Repairing is a day-by-day matter, the occasion for which is generally unpremeditated, but always more or less expected. It may involve serious repairs due to accident or the failure of defective parts, or merely trifling adjustments and replacements. It may involve the use of much or little of the mechanical equipment of the shop; but for its efficient accomplishment, complete equipment, sufficient for any contingency, must be available. The chief asset in repairing is speed, consistent with good workmanship.

Overhauling, on the other hand, is a carefully-planned routine in which each vehicle is planned for far in advance. It involves work of a more or less elaborate nature, and each job is likely to call for the use of practically all of the mechanical equipment of the shop. Celerity is desirable, but thoroughness and completeness are the principal objects. The repair shop is the emergency clinic; the overhauling shop, the sanitarium for a thorough course of treatment.

Notwithstanding the sharp line of demarcation which has thus been drawn between running repairs and overhauling, the two are very closely related and the practice with respect to the one has a profound influence upon the best policy to pursue in the other. Daily maintenance involves careful inspection, a comprehensive system whereby the drivers report every irregularity of operation intelligently; a shop system whereby all needed repairs are made promptly and effectively; equipment and personnel adequate to meet all emergencies promptly and satisfactorily; all of which will go a long way toward simplifying and saving expenses in overhauling. Conversely, overhauling that is done thoroughly and completely and at intervals best calculated to agree with the actual requirements of the operation, aids materially in reducing and simplifying the running repairs required in the interim.

Nowhere else than in the maintenance of motor buses is it more true that the proverbial "stitch in time saves nine," and nowhere is the temptation stronger to "spoil the ship for a penny's worth of tar." In the latter category are such short-sighted policies as the use of cheap oils and lubricants; too infrequent changes of oil in the crankcase, transmission and rear axle; prolonged delay in relining brakes; failure to keep spring clips everlastingly tight; or permitting the body varnish to become cracked and discolored before applying brightener and new luster coats. None of these little items of neglect take immediate toll; but all develop from minor imperfections to major derangements which lead to unsafe operation, unreliability and extensive and expensive repairs.

Misalignment of the front wheels, often caused by minor collisions or side-swiping of curbstones, is easily remedied; but tragically also, easy to neglect. The bus still performs with no perceptible difference. Steering seems to be the same and the tires do not show the effects until considerable mileage has been covered. Yet, every mile that is run is the equivalent of two to five miles of normal tire wear, wear on the steering gears, their bushings and connections, with the constant liability, in some cases, of the driver's losing control of the steering.

Neglect of universal joint lubrication, usually due to procrastination, superinduced by reluctance to get beneath the chassis for this brief but unpleasant duty, causes accelerated wear, which nevertheless, keeps the guilty mechanic's secret for many hundreds of miles before the worn bushings voice their complaint in squeaking, rattling and back-lash. Yet, during this time the life of the joints has been cut down alarmingly; every part of the driving line has been severely racked by the persistent and steadily aggravated hammering of excessive back-lash, and toward the end the bus operates in continual danger of breakdown on the road, due to eventual failure of the abused parts.

A sticking, pitted or mis-adjusted engine valve only gives a slight clatter or irregular firing beat to reveal its presence, and will go on jeopardizing the health of the valve, its guide and the tappet, until serious consequences ensue. The remedy, applied in time, is simple, inexpensive and obvious; but delayed unnecessarily, it becomes difficult, costly and tedious.

A neglected fan-belt adjustment, worn-out radiator hose, a slipping clutch, pitted magneto points, leaky manifold gaskets and a host of other minor derangements, which no operator can hope to avoid, not only store up trouble for him when the day of reckoning arrives; but unless caught in time are bound to lead to disrupted schedules, inconvenience to passengers, disgruntled drivers and increased operating cost. The cost of conscientious, thorough and regular lubrication, inspection and adjustment is small. The penalty for its inadequacy or lack is heavy, not only in its immediate consequences; but in the eventual reckoning at overhaul time.

The Periodic Overhaul

In general, there are two species of overhaul practice: the periodic plan and the unit system. The former is known as the general overhaul, in which the bus is withdrawn from service for a stated number of days and gone over completely to virtually rebuild it to perfect mechanical condition. This takes place at periods whose frequency and basis depends upon three principal factors, namely: the conditions of service, involving the severity of the roads, grades, traffic, etc., the daily mileage and the carefulness of the drivers; the make of the bus, which of course, determines the durability of the mechanism, and the frequency with which bushings must be renewed and other wearing parts replaced or refinished; and, finally, the general character of ordinary maintenance, as previously enunciated.

In some cases the intervals at which each bus is called in to be overhauled are determined upon a mileage basis, and in others on a time basis. It matters little which, since in a regular bus operation the two are more or less mutual functions, although in some classes of bus work, notably sightseeing and resort service, the daily mileage may so vary with the seasons that a mileage basis is preferable. It sometimes happens that the exigencies of the service and the capacity of the shop require a strict time schedule regardless of mileage, through inability to spare vehicles from service during rush periods, and the desirability of advancing the overhaul of certain buses in non-rush seasons to keep the work for the shop equally distributed through the year.

The Unit Overhaul

The unit overhaul system is quite different from the periodic. As a rule, it is only applicable, with any degree of efficiency, to installations where a high degree of standardization has been achieved. In other words, where the buses are of uniform make and type. It consists of a scheme whereby, instead of laying up the vehicle entirely and giving it a complete overhaul at one time; it is merely called in long enough to exchange one of its major assemblies, such as the engine, transmission, rear axle, etc., for a spare assembly, the overhaul of the removed unit going forward while the vehicle remains in service. This system is capable of very high development, in that the exchange of a major assembly is made during off-peak or non-rush periods when a certain number of buses are withdrawn from service anyway; thus reducing the time lost from schedule service to little or nothing.

The unit overhaul system offers the further advantage of permitting the interval to vary between overhauls of the various assemblies. An engine may require an overhaul every 60,000 miles, whereas the rear axle may need it only every 150,000 miles, the transmission every 90,000 and so on. This, of course, differs with the various makes of buses. The ideal design is such that these periods are more or less equal for the various units. Of course this ideal has never been attained. In consideration of the varying severity of the duty on various parts according to the geographical conditions of operation, it must remain merely an ideal, not capable of realization. Hilly country may make no severer "demands upon the front axle system"; but it may shorten the interval between overhauls of the transmission and brakes very materially. However, in the best-designed chassis, the frequency with which overhauling is necessary is much more uniform for the various assemblies than those which are made up of the products of different, independent manufacturers. Some buses have excellent engines, capable of operating for protracted periods without overhaul; but are fitted with transmissions requiring overhaul much more frequently. The general balance of the design also exerts a potent influence, for where the engine is powerful and out of proportion with the torque capacity of the driving system, the life of the latter will certainly be materially shortened.

Determining Overhaul Policy

It is maintained by some that the unit overhaul system is inherently the more economical because the buses are kept in active operation a greater part of the time, and subsequently, investment in and maintenance of spare buses is reduced. It may be pointed out that this apparent economy is offset by the necessity of maintaining a large number of spare engines, transmissions, clutches, axles, etc. Of course, unit overhaul, to a certain extent, is universally practiced. No operator thinks of laying up a bus while a magneto, a generator, a tire or a spring is being overhauled; spare units of this description being kept in readiness at all times for such emergencies.

From this it will be seen that it is not possible to lay down any hard and fast rule as to which overhauling policy is better for all operators. The conditions in each operator's case must be separately analyzed and a policy adopted that will best suit the conditions encountered, the shop equipment available and the peculiarities of the buses themselves. In many cases a combination of the periodic and the unit system of overhauling will be found to work out the best. Even when complete unit overhauling practice is determined upon, a general overhaul becomes necessary after a time, because it is not possible to remove the frame or the complete wiring system to substitute an overhauled one without virtually disassembling the chassis.

Similarly on a straight periodic system of overhaul, the various units, when removed, are not worked on in the chassis, in order of sequence, or by the same crew, as a rule. Instead, each main assembly is removed from the chassis and while the frame, the wiring system and springs are being overhauled, each of these other major portions is being given individual attention by specialists. By the time the frame is ready again to receive its engine, transmission, axles, etc., these have been rebuilt.

Some operations of small size cannot justify the maintenance of a shop with sufficient facilities for overhauling along these lines. They must depend upon the service stations of chassis and accessory makers in their localities for unit service. In such instances it is possible to reduce the frequency with which a general overhaul is necessary by leaving the unit assemblies at such service stations for overhaul, while operating on a spare or service substitute unit.

General Overhauling Hints

Whatever policy of overhauling is adopted, the most important thing is to have the work done thoroughly. At the time of an overhaul it is usually found that a certain number of the wearing parts, such as bushings and bearings, show wear, although still in a condition to give an appreciable amount of mileage before replacement is necessary. There is always a temptation not to disturb these parts, only replacing those in imminent danger of destruction. However, unless such partially-worn parts will unquestionably last until the next overhaul period or unless they are easily accessible and removable after the bus is back in commission, they should be renewed, because the cost of replacement between overhauls is apt to be many times the cost at the time of overhaul.

All manufacturers, from time to time, effect improvements and refinements in their products. Some of these, of course, are entirely new designs, not interchangeable with previous products; but many, on the other hand, are interchangeable. In many cases, the advantages of the improvement will merit the change at the time of overhauling. Accordingly it is a wise policy to keep informed of the interchangeable improvements and prepare in advance to take advantage of them at overhauling time.

One of the cardinal requirements in a good overhauling job is cleanliness. Whenever a chassis or an assembly is overhauled it should be disassembled as far as practicable and each part thoroughly cleaned. Proper cleansing of many of the parts is virtually impossible after the chassis is assembled and the body installed. Dirt not only has an affinity for oil and is, consequently, apt to be drawn into bearings and bushings; but it also attracts and holds water, destroys paint and varnish, and rust is its usual accompaniment.

Inspection and testing are important items in overhauling procedure. Whether overhauling is accomplished unit by unit or *en masse,* all fits, clearances and adjustments should be verified as the work proceeds and each main assembly tested for alignment, operation and freedom from binding. When the chassis is again assembled, it should be tested, preferably loaded with concrete blocks to approximate load capacity, and again inspected thoroughly for loose connections, leaks, etc., before finally installing the overhauled body.

CHAPTER VII

Indirect and Supplementary Revenue

Classification of Revenue, Direct and Indirect

REVENUE from buses may be divided into two general headings, namely, direct and indirect. Direct revenue is of course, that which is obtained in the form of straight financial return for service rendered. Cash fares, and the revenue from tickets paid for either in advance or enroute, constitute the immediate source of direct revenue. Transfers issued by other carriers also come under this category for, even though the return is not so immediate, co-operating companies must make periodical accountings of transfers issued and received. Indirect revenue applies in cases where it is found expedient to run a bus or buses to a point to which a sufficient number of people would not be inclined to go unless some attractive means of transportation were available.

Amusement Parks

Amusement parks are usually located on the outskirts of cities or towns and in many cases transportation facilities are not ideal. Many of the patrons of such resorts object to being crowded into conveyances when on their way to places of recreation. The riding habit cannot be fostered by hardships and it will be found that a bus line, even if operated at a loss, may form new habits and reform old ones which might prove highly profitable. There are many other instances where buses may be profitably operated even though the fare received is not the chief source of income. Consequently, it will be seen that revenue may be classified as not only direct or indirect but as a combination of both.

Hotels

For instance, there are many hotels in the country which are in a position to generally demand that reservations be made in advance. Of course, many of these are so located that the traveling public, more or less automatically, finds its way to their doors. However, it will be found that in the majority of cases, the popularity of an hostelry can be attributed to years of satisfactory service. Many hotels, which have not as yet reached the point where they can put up the "House Full" sign every night, are finding that a private bus line which, while not in any sense of the word a gold mine in itself, is proving to be a very important factor in the economic life of the hotel. Such a private bus line is even more necessary when the hotel is off the beaten path. The general traveling public is anxious to get accommodations as quickly as possible, with the least possible effort, and all things being equal between two hotels, the one that provides quick, comfortable transportation to its doors will have the greatest patronage. A bus, plainly marked and well attended, will often prove a well made investment, even though the direct revenue derived may not pay the running expenses.

A number of hotels in Chicago have inaugurated a bus service between their hotels and Chicago's retail district in the Loop and the railroad terminals. In most of these instances street car lines run near the hotels, and the city bus line, charging a ten cent fare, is only a short distance away. However, neither the street car nor the other bus line can be said to constitute competition as they do not measure up to the comfort and luxury demanded by the patrons of the hotels. The operation of these original installations have proven successful enough to warrant additional equipment in most cases and encouraged other hotels to follow suit.

Selling Bus Advertising Space

In most cases revenue from fares is considerably in excess of operating and maintenance cost, but even if this were not so, the proprietors of the hotels consider that the distinctive appearance of the buses constitutes a medium of advertising which cannot be discounted. It has been proven that the convenience of this transportation brings many additional guests.

Where only a few buses are used in an operation it is often possible for the operator himself, with very little expenditure of time, to procure contracts for display cards in the advertising racks of the buses from merchants in his community. However, if the fleet operated is of considerable proportions the operator would be wise to get in touch with an advertising agency that makes a practice of selling such space. They frequently have customers from out of town who will use the space in addition to the local concerns.

Stores

Department stores are usually located in or near the center of a city. With the ever increasing popularity of the automobile, parking space near such stores is fast becoming rare. These stores depend to a very marked degree on the patronage of women, and those who are fortunate enough to possess automobiles usually do their shopping in them. However, when the conditions are such that they find it impossible to park their cars within a reasonable distance of their favorite store, they are very much inclined to enter those stores which are nearer the place where they eventually succeed in leaving their car. In many cases cities have arranged for definite parking spaces, away from the center of the city, such as at Grant Park, Chicago, and there is no doubt that, with the congested traffic problem becoming acute, more such places will be established, and if they are some distance from the shopping center it is evident that the stores that provide buses to bring these riders to their doors will profit greatly for the service performed. Department stores which, through satisfactory service and courtesy, have worked up a profitable clientele in the past, are loath to find that their competitors are getting much of their hard earned business. If, however, a department store should inaugurate a bus service from those localities where parking is still possible to the store, and if this service should be maintained in a manner to instill confidence in the people who ride on it, the financial loss occasioned by the limited parking space near the stores would be entirely offset. Some arrangement could be made whereby the rider would receive a coupon in exchange for his or her fare; this coupon exchangeable for merchandise at the store. The buses need not confine their route to the immediate neighborhood of the store or to the area where parking space is available, but could run on regular schedules to points where passengers are discharged from elevated and street car lines thus forming new associations and new habits.

In many parts of the country, shoppers from the outlying communities make regular trips to the city. As a general rule these shoppers have favorite stores, but it has been found that where a department store bus line makes a regular scheduled stop at the railroad station many of these passengers can be induced to enter the bus and change their shopping place at least for the day. Whether or not shopping habits can be reformed and new regular customers obtained for the store, depends to a great extent on the appearance of the buses and the methods by which the line is conducted.

Sources of Additional Revenue

While it is true that the operator of buses must rely for his revenue on the regular fares incidental to a regular line, there are a number of ways by which this revenue can be augmented. These means of additional income will, of course vary considerably with the locality in which the line operates. Furthermore, in cases where only one or two vehicles are operated, revenue which to the large operator would be but a small proportion of the line's earnings, may constitute sources which the small owner dare not ignore or neglect.

Reserve Buses Can be Used for Special Work

Ways by which buses can be made to augment the revenue derived in the form of fares are that of special runs and charter parties. One might be inclined to inquire as to how vehicles which are operated on definite schedules could be spared for special work of this kind. Returning again to Chapter II, it will be noted that in cases where the operation involves a considerable number of buses there are two sources from which buses for special work can be drawn. These sources are the natural reserve vehicles which must be on hand to take care of replacements and those which are used only during the rush hours and which return to the garage as soon as the line resumes normal headway. Of course, no set rules can be laid down for influencing additional revenue of this kind as there are probably no two localities in the entire country where the conditions are identical. There are, however, a few sources which are more or less common to all localities.

Picnics

Churches, in general, have annual picnics for their Sunday School children. In the past the governing factor in the arrangements of such picnics has been, not so much the suitability of a particular place as an ideal site, but rather the means of transportation available. When the town or village in question is located on a water-way of considerable size, the problem of both site and transportation is comparatively simple. In the majority of cases river and lake steamers stop, or can be persuaded to stop, near a, more or less, ideal picnic ground. However, even children object to going to the same place year after year, and the motor bus is proving a very popular means of conveying them to new locations.

In many towns and cities the trolley system, either local or interurban, passes a park which is used as a picnic ground, and it frequently happens that the local transportation company is financially interested in the park. Most of these grounds were started as a practical location for wholesome amusement, but many of them have been so spoiled by concessions that many parents do not look on them with favor. The result has been that picnic committees have been forced to look further afield for suitable locations. Here the motor bus is proving to be the ideal means of transportation. Safe, clean, quiet and speedy, a bus ride to some distant grove where games may be indulged in and lunch served, not only appeals to the children, but is looked on with favor by the parents and older folks. In a greater or lesser degree than that which has been stated about Sunday School picnics also applies to both day school and industrial picnics.

Field Days

Field days have always been popular and most employers have found that athletic contests, either between members of their own organization or between their employees and those of neighboring plants, breed an attitude of mental content which reacts favorably on the quality and quantity of their product.

Fraternal orders and lodges also find field days very welcome by their members as they break up whatever formalities may exist in the regular meetings. In the free-for-all atmosphere of the open air, faces are seen in a new light, and new acquaintances and friends are made. For all such outings as these and many others, buses are in great demand, and the owner or operator of such vehicles who does not advertise the fact that he can supply transportation for all such festivities is indeed unwise. In fact, if one were to go into the fullest detail as to all of the sources of revenue other than from straight bus line operation, this book would assume very formidable proportions. Let it suffice therefore, to mention in passing, a few of the more obvious means of making buses prove their worth.

However, before leaving this subject it should be noted that business of this kind does not ordinarily come unsolicited. The public must be informed as to the character of the goods offered for sale and it is therefore wise to circularize the territory covered by the bus operation. Letters should be sent out to all of the local political and welfare associations, business and recreation clubs and to such other groups who might have occasion to use bus transportation from time to time. Small newspaper advertisements can also be used for this purpose. In either case fullest details should be given such as the size of parties which can be accommodated; the operating areas; and the rates charged for such service.

Conventions

Conventions of various kinds are usually held in places where there are some sources of amusement. During such conventions, transportation must be provided. The delegates must be taken from the trains to the hotels, from the hotels to the meeting places and from the hotels and meeting places to and from places where the delegates can be amused.

Theater Parties and Weddings

Group theater parties, or guests attending weddings held at some more or less distant point often prefer a means of conveyance which, while offering the utmost in comfort, will still permit of a "jolly party" to and from their destination.

Inspection Tours

Executives and engineers are often required to make tours of inspection or educational trips to a number of manufacturing plants located in the same territory or to branches of the same large plant. Considerable discussion usually takes place on such a tour and as the participants of the tour move along through the various departments, manufacturing practices and principles or more scientific topics are gone over in detail. If it is necessary to break up such a party into small groups in order that they may ride around between plants in private cars much of the value of such discussion is lost. Owing to this fact, buses are to be preferred as a means of transportation.

Schools

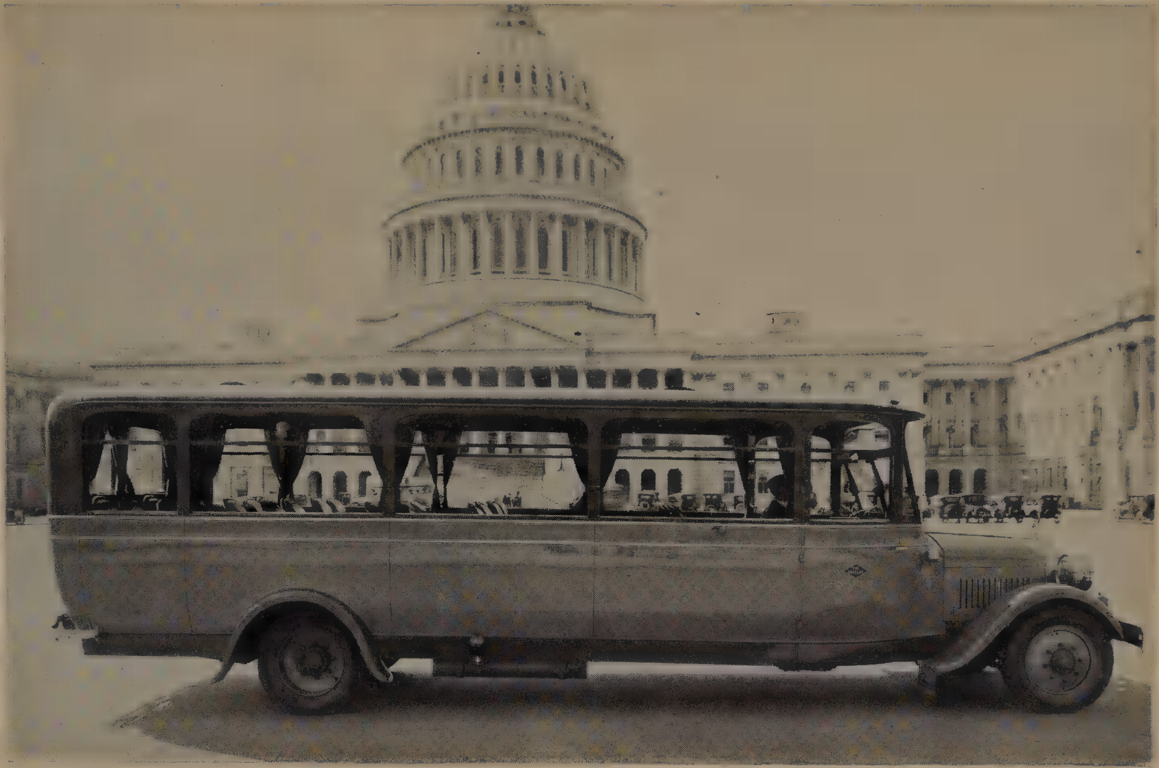
The Little Red Schoolhouse in rural districts is fast disappearing, and in its place is arising the consolidated school. This larger and better equipped type of school has had considerable effect on the education of the younger generation. The greater number of pupils served has made it possible for a higher standard of tuition to be maintained. This innovation in education has been made possible by the increase in good roads and the motor bus. Such an institution has made it necessary for a great number of the pupils to travel a considerable distance to and from school, and this would be a hard-ship, especially for the pupils of the lower grades, if such convenient transportation facilities were not available. Furthermore, parents would not care to have their young children out of the jurisdiction of either their selves or the teachers for long periods of time.

These disadvantages of the consolidated schools were recognized by the school authorities and provision made for buses, by purchase outright, by either the City, the County or the Townboard. However, in many cases, buses are rented, and many operators have found a school contract to be a gratifying addition to their income. Where extra buses are used in the morning to carry factory workers it has been found that these same buses can be diverted to school work starting usually about 8:15 A.M. and running again at 3:00 P.M. Suburban lines have frequently been able to change their schedules in order to take care of this line of work. The De Camp Bus Lines, of Livingston, N. J., is one example of a bus line that has found this source of revenue very profitable.

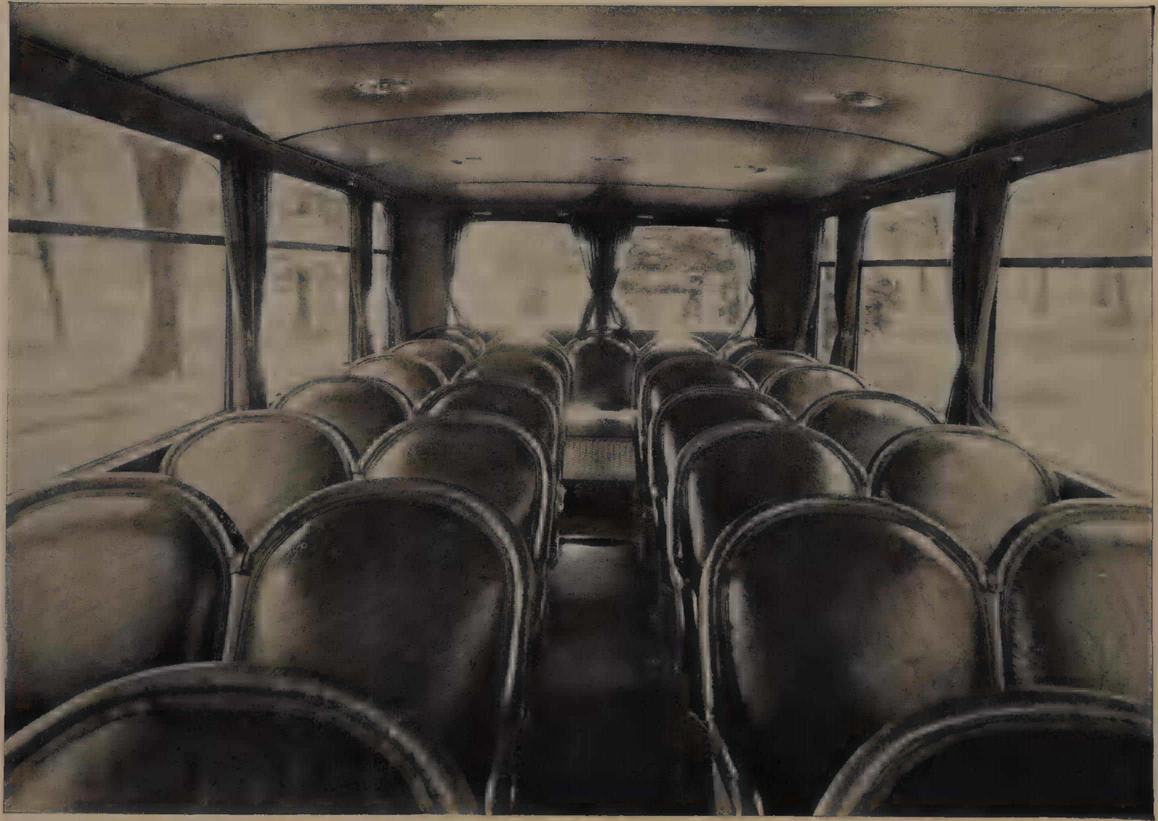
In larger cities many bus operators have found school work profitable both by arrangements or contracts with the school boards or the heads of private schools, or by direct solicitation of parents. A canvass made of the territory surrounding a school has proven conclusively that parents are very much in favor of sending their children to school on a bus which passes their door at an appointed time. They meet with enthusiasm the prospect of seeing their children alight in front of their homes at a definite time after school. The charge for such service can be extremely moderate per child as no difficulty will be experienced in most cases in filling the buses, whose seats will accommodate a great many more children than adults.

Sight-Seeing Trips

The business of conducting sight-seeing bus routes is not usually directly connected with any of the other



AN EXAMPLE OF THE MODERN SIGHT-SEEING BUS IN FRONT OF THE CAPITOL IN WASHINGTON, D. C.



INTERIOR VIEW, SHOWING SEATING ARRANGEMENT OF MODERN, LUXURIOUS SIGHT-SEEING BUS.

aspects of bus operation. Sight-seeing lines or routes are usually maintained in localities where the popularity of such a form of diversion or amusement has been proved. For instance such cities as New York, Chicago, and Washington, have many transportation companies which confine their operations solely to sight-seeing buses.

The fares on such buses are usually high and not commensurate with the mileage covered, compensation being made in the form of personal explanation of the points of interest along the route. A different type of vehicle is used for this work, and no direct parallels can be drawn between bus line operation and sight-seeing bus operation.

The tendency in the sight-seeing business in the past few years has been toward better and more comfortable bodies, usually inclosed so the tour may continue, even in inclement weather. This has frequently been done at the sacrifice of seating capacity but this has been met by greater revenue being obtained because of the attractiveness of the bus, a larger percentage of seats filled and by increased fares, in keeping with the operation on a higher and more luxurious plane. A very good example of the latest type of sight-seeing body is used by the Gray Line, in their Washington operation. The photographs opposite show the influence of sight-seeing on a bus body, for it will be noted that the windows are extremely long and the posts very narrow, in order to permit all the visibility possible.

In some instances, particularly in localities where there are many points of national interest along a route, regular schedules are adopted and adhered to, reliance being made on the fact that even though a vehicle be forced to run through one round trip with but few passengers, the very great excess of tariff charged over operating expense and the volume of business done during a day will more than make up for lean trips. Such regularity of schedule breeds a feeling of confidence and acts as a medium of valuable advertising, as pleased customers will always refer their friends to the line. In many cases, however, sight-seeing buses on such tours as to the Chinatowns in some of the larger cities, and to beach resorts, do not make any attempt to operate on regular schedule. The bus appears at its depot on a more or less regular schedule, but does not leave for the run until the operating official in charge feels that either he has drawn all of the customers available or the grumbling of his waiting would-be riders makes it advisable to get under way.

Long Distance Tours

While work of this kind is primarily within the province of interurban and deluxe type buses, much profitable revenue can be obtained through the medium of extended trips. In many instances conventions held at points 200 or 300 miles distant from the home center are attended by groups of local citizens. These delegates usually charter a railroad coach for the trip but with the growing popularity of the bus in recent years many organizations have chosen the bus in preference to the former method.

Similarly, camping parties can be introduced as an innovation. Buses fitted with the necessary equipment can stay over on two or three day trips covering various points of interest within a reasonable distance of the starting point.

In the past few years a number of concerns have been started that have devoted their energies entirely to the touring business, and other concerns who are in the sight-seeing business have added a touring department to their organization. They arrange for trips between distant cities that may take a week or even two weeks to cover, and in their plans they take care of hotel accommodations, meals, etc., as well as local sight-seeing trips in the towns they visit.

In touring of this kind, the fare is usually incidental to the total expense and for this reason a very high rate per mile is secured. The tours between New York City and Chicago, New York City and Niagara Falls, and Boston and Montreal are examples of this type of business, and there is no doubt that the next few years will see numerous additions.

It must be remembered, however, that revenue from such sources can not be hoped for unless considerable advertising is done. People as a general rule do not consider motor buses as mediums for vacation parties, but some of the bus operating companies have found that once the ice is broken the innovation of a motor bus vacation is readily accepted.

Real Estate Development

The bane of most real estate promoters is the inaccessibility of their developments. This is of course natural, as communities spring up only if there are transit facilities available. Many such promoters have found that a well organized bus line to their development would more than pay for its initial cost, in the way of new properties sold and new houses built. However, the effect of such a line is entirely lost on the prospective buyer unless the line is of a permanent nature. High class transportation facilities to a new development are not a novelty, as the far-sighted real estate investor realizes that there is every likelihood that after the locality has been developed to the satisfaction of the development company that the facilities will probably be withdrawn. One way to insure permanent transportation to and from a development is by means of a contract with a local bus operator. During the initial development period no bus line could even pay its carrying charges, but if the development company should guarantee a regular revenue to the bus operator from which will be subtracted the actual fares collected each day as the locality builds up, it will be found that before long the line will be supporting itself.

Express Shipments

Express companies, not referring to local organizations who call themselves express companies, must confine their activities to municipalities served by the railroads. There are however many localities in the country which require express service but which are not on the railroad. A bus line operating between the railroad and such a locality may find the pickup and delivery of express matter very profitable.

Out-going matter can be handled without delay, as the express company will accept shipments from the driver of the bus who in turn can deliver the express company's receipt to the consignor on his return trip and collection could be made, not only of the express tariff in case of express prepayment, but of the carrying charges due the bus line.

Delivery from the express depot to the consignee may be made in an equally simple manner, but in this case, arrangement must be made to obtain the signature of the consignee. If the bus line stands in the good graces of the express agent, the agent will deliver the express receipt card to the driver who will have it signed on return to the consignee's town, after which actual delivery can be made on the next round trip. This method occasions some delay, consequently, if such a shipment is expected by the consignee he can give the driver of the bus a letter order on the express company. The express agent will attach this order to the card which should bear the consignee's signature and delivery can be made without further delay. Bus lines carrying on this type of work should have receipt blanks prepared on which notation can be made of the amount paid to the express company on receipt of the shipment, and the additional carrying charges made on account of the bus line.

Express tariffs are regulated by what is known as the "block system." In other words the country is divided into sections called blocks. All points within each block have been given the same express rate. Consequently the fact that the destination of an express shipment is outside the actual working area of the express company does not constitute legal excuse for charging an additional tariff even though it were found advantageous to make delivery on such a shipment. Therefore, when the address of the consignee is not within the area served by the company's pick up and delivery system it is customary to merely notify the consignee by post card of the arrival of express matter and where it is held. There are cases, however, where the volume of business either actual or prospective, makes it feasible for the company to take further steps to insure satisfactory service in the outlying districts. In a number of instances the express company has made contracts with local hauling companies operating within the same express block but off the regular express routes. Under such contracts the local company merely acts as the agent of the express company and can only collect such tariffs as the express company dictates. In such cases the express company is accountable for damage or loss of shipments even while in the hands of the local carrier. Consequently, before a contract of this nature can be obtained, proof of responsibility on the part of the local organization must be submitted and accepted.

While in the past, work of this kind has been confined almost exclusively to freight handling or so called local express companies, there is no reason why interurban bus lines should not take advantage of this means of securing considerable additional revenue. It is true that in most cases the bus line will merely run through a town or a village, and that the maintenance of schedule will not permit the driver to stop en route for the purpose of picking up or delivering express matter. However, arrangements can be made with local companies to receive shipments at the local depot of the bus line or to make deliveries to the depot.

Newspapers

In small rural communities the inhabitants have often been forced to wait for their daily papers until they visit their shopping center, or, until the mail man in the rural free delivery system made his trip. With the advent of the radio the rural population are anxious to get their newspaper, carrying the radio programmes, as early as possible, and the bus line running from centers through rural communities has been able to be of assistance, with profit to themselves.

Bus operators have made arrangements with the local newspapers to carry the papers directly to the door of the subscriber, when the subscriber is on the bus route, or to deposit them in bulk for the community at the neighborhood store or rendezvous.

Mail

The United States Post Office Department must deliver mail regardless of the fact that much of this mail is addressed to individuals located in more or less isolated communities. The Rural Free Delivery system is very vast in its proportion, but in many instances the source from which this rural mail is sent out is in itself isolated from the railroad. In cases of this kind delivery is made from the railroad to the center of circulation by means of what is called a "star" route. A contract is let by the Post Office Department to a corporation, or an individual who in turn undertakes the delivery of this mail under certain definite conditions laid down by the Post Office Department. While the volume of business done on most star routes demands the use of a motor truck, there are some communities in the country where the rural free delivery system has not as yet reached pretentious dimensions, and there are bus lines operating in these fields which have obtained star route contracts.

While it must be admitted that the railroads are the logical carriers of the mail it is a significant fact that the Post Office Department very recently canceled its mail carrying contract with one of the large trunk line railroads operating through the State of Indiana. For more than thirty years this railroad has had the contract for delivering mail but, under a new schedule put into effect by the railroad, it was found impossible to get mail to four towns within the state in time for delivery to the rural routes the same day.

A bus line obtaining the mail contract delivers the mails to these same points twice a day.

Additional Revenue Derived from Advertising

There is another source of income which must not be overlooked; namely, that derived from advertisements of outside concerns. It is usually found that merchants located in the territory through which the buses operate consider bus advertising very profitable.

Car Cards

The most usual type of merchandise advertising done in buses is by means of car cards. Practically all modern city type buses are equipped with racks into which these cards can be slipped. The standard size of such cards is 11 × 21 inches, and the number which can be used varies between 18 and 22. This size has been adapted for bus advertising because it is the standard size used by most street cars and railway cars. By adhering to this size, an advertiser who has been patronizing either street car lines or railroads can provide from stock, duplicates for additional bus advertising.

The cards are held in place by flat springs placed over the joints between cards. These springs are usually japanned black and not only prevent the ends of the cards from becoming torn, but also make a neat border between the cards. These springs should be very thin, but highly tempered so that they can be taken out and replaced without undue effort, and will at the same time retain their shape. Modern city type buses are usually equipped with these springs. However, as careless handling may result in some becoming lost new ones may be required from time to time.

It has not been considered good practice in this country to use any part of the outside of the bus for advertising posters or placards of any kind, although in some cases a special rack can be provided to announce special events, such as football games, exhibitions or conventions, that would be of general public interest and would help to develop bus riders. This space, however, should not be sold but should be given gratis to the association or institution holding the event announced. The use of auxiliary racks within the bus is not considered good practice as it lessens the effect of the rack cards and cheapens the general appearance of the bus. This, in turn, tends to discourage rack advertising and decreases the space rates for which rack cards are sold.

However, on certain types of city buses the use of a narrow strip along the back of each seat would not be objectionable. This is frequently done on the upper deck of double-deckers, and when this is done it is advisable to use a more or less permanent sign that is put on for the year and fastened in such a manner that there will be no tacks or screws protruding to tear the riders' clothing. For the same reason the sign itself, if a metal one, must be secured so that the sharp edges do not turn up to injure passengers or their wearing apparel.

Arrangement of Advertising Contract

When a business connection is made with an agency or space-selling organization, a clear and fair contract covering all of the necessary conditions should be executed. In most localities this contract runs for a year and gives the agency the option of renewal in the event of reasonable satisfaction. In order that the contract may be binding, the operator usually receives a set sum per bus in addition to a percentage of sales made. The set sum or binding consideration should be in the neighborhood of $25 to cover the usual legal requirements.

Agencies usually agree to pay the operator a certain percentage of the gross receipts for advertising space sold. It is quite impossible to get a definite percentage which will cover all cases, since the conditions under which the seller must work influence his selling cost so greatly. For instance, conditions may be such that the space can be very easily disposed of, in which case the operator will be entitled to a rather high percentage. On the other hand space may be difficult to sell and the selling organization may find it necessary to greatly increase their selling expense. In the latter case it would be only fair to assume that the operator's percentage would be comparatively low. Speaking in general, percentages received by bus line operators vary from 25 to 60 per cent of the gross receipts. In any event a fair and profitable commission to all concerned can be worked out.

The circulation of any piece of advertising is the number of persons who can reasonably be expected to see it. In the case of bus card advertising, the circulation is measured by the number of passengers carried, since all advertisers buy space from an agency on the basis of how many people are going to see their advertisements. It is essential that the bus operator keep his space seller informed as to the number of fares paid.

The advertiser must further consider the character of the persons who will see his advertisements. For instance, the buses in New York, on Fifth Avenue, carry an unusually wealthy circulation, whereas a bus operating in a factory town would have riders of an entirely different character. Facts as to the number of men, women and children who ride, their occupations, whether they ride on a bus when going shopping, or to work, and so on, are of great interest and very necessary in the determination of what such advertising space will do for the advertiser. All of this information should be carefully gathered, studied, and freely given to the advertising agency.

What rates should be charged for the use of space is a matter that cannot be settled except by a study of the bus line involved. The rates for such advertising at present are usually quoted as so much per card per month; the contract with the advertiser running for a year under ordinary conditions. In large cities the circulation obtained for each dollar spent may be as low as 5000, while in other cases, owing to locality and character of riders, the agency may find it necessary to assure a circulation of betwen 25,000 and 30,000 for each dollar expended.

Some advertisers, and in particular small local concerns, do not care to go into the matter of advertising on a basis of straight circulation and prefer to receive their quotation in terms of dollars per card per month.

Present rates per card run from $2 per month which is at the rate of a city bus line charging a 10 cent fare and carrying a wealthy class of passengers, down to 75 cents per card per month, which is the rate charged on a number of bus lines carrying fairly average passengers comprised of shoppers, factory workers, office workers, commuters, etc. The $2 rate is very high, and cannot be looked for except under especially favorable conditions.

In the general run of street car advertising the price per card per month is about 60 cents. The space selling company ordinarily bills the advertiser, collects the money and turns over the proper percentage to the operator within a reasonable time. When there is a short delay in putting up the advertiser's card, the contract must not be considered as broken, but the delay is made up at the end of the contract period. Furthermore, when cards are omitted through error, the advertiser is entitled to a pro-rata deduction for the space lost. Advertising cards should always be neat and properly in place, no blank spaces appearing, there always being on hand a sufficient number of cards to replace damaged ones. Whenever it is found impossible to sell all of the space, the bus line operator should have cards prepared, advertising his own line. This is not only good policy as far as the operation of a line is concerned, but prevents unsightly gaps in the card racks.

The operator should also see to it that the character of the illustrations and text of the "Ads" are such that they cannot reasonably offend anyone. If an offensive advertisement is allowed to appear in the bus it will not only hurt other advertisers, but will give the public an unfavorable impression of the line.

Another profitable source of income is from advertising space sold in terminals and waiting rooms. Where such space is available, it is particularly valuable as at these points large groups of people gather while waiting for their buses. This space can be subdivided into uniform sections and sold to advertisers either by the operator or by the advertising agency employed for selling car card advertisements. It is recommended that neat frames of moulding be constructed, having a clean-cut, attractive appearance. They can be of the regular 11 × 21 inch size if desired; but ordinarily this type of advertising is in one or two sheet poster size, the one sheet poster being 30 × 46 inches and the two sheet 46 × 60, the longer dimension in each case is usually the vertical sides.

For the one sheet poster a fair rate per month will vary from $2 to $7.50 according to the size of the crowds gathering at the terminal. In ordinary cases this space will bring approximately $3.50 each per month. The two sheet poster should bring about 75 per cent more than the single sheet. Of course special rates can be worked out for special advertising signs and cards of different sizes.

Time tables, maps, tickets, folder booklets and leaflets and in fact any form of printed matter required by the bus line or used in its operation can serve as an advertising medium. Space on time tables and bus line advertising booklets is very valuable and can be sold with little difficulty. Hotels and stores along the route should be solicited, but before any attempt is made to close contracts for advertising of this kind, a careful survey should be made of general and particular conditions in order that a fair rate for such advertising may be arrived at.

Space on leaflets, maps or time tables is generally at a premium, but owing to the many contrasting conditions in various parts of the country, it is impossible to quote even an average rate here.

Filling Stations

Another profitable source of revenue is from the sale of gasoline. Many bus lines will use enough fuel to warrant the installation of large tanks. There is no reason therefore why additional provision should not be made for retailing gasoline. The Manhattan-Plum Beach Auto Stage Co., Inc., has had three 550 gallon tanks installed, in which is stored the fuel for the company's buses.

During 1923 they purchased $19,000 worth of gas, $15,000 worth of which was used for the company's 25 buses. The remaining $4000 worth of fuel was sold to private consumers and constituted a source of revenue very worthy of consideration.

CHAPTER VIII

Costs

Bus Operator Must Know Costs

THE successful bus operator of the present day has been through the mill. Unless greatly favored by luck, his first endeavors were very discouraging and only by dint of much perseverance and hard work has he attained any degree of success. The operation of fleets of motor buses is a very complicated and intricate business, and should not be entered into without due consideration. There are many pitfalls in the path of the average operator, into which he will surely fall unless study is made of the business from every angle. It is said that experience is the best teacher; but in most cases experience comes high, and by far the best method of side-stepping such expensive experience is to take advantage of the advice of those who have made a careful study of bus lines and their operation.

Except in a few cases where indirect revenue may constitute recompense for the operation of either single buses or fleets, a direct profit must be made. Profit is, of course, that which is left after the various expenses incurred have been subtracted from the gross income, and even though an economic study may presage a gross income which is considered ample, a bus operator cannot prophesy success unless he has a clean-cut idea of what his operating expenses will be.

The cost of operation of a motor bus consists of the summation of a large number of individual items of expense. These items are subject to great variation according to: conditions of service, design of the bus, nature of the body, quality of the maintenance accorded to the vehicle, the skill of the driver, the locality in which the bus is to operate, traffic conditions, road conditions such as grades, condition of pavement, and the actual volume of work which the bus must do.

The variation in these items is not affected alike by the differences in operating conditions. Consequently the cost of operating a bus will not be the same under different conditions, nor will the cost of operating under the same conditions vary proportionately with the amount of work which the bus must do. For this reason average costs mean but little, if anything, and it is useless to expect that the results of inquiries made of other operators will apply. In the first place too few operators keep accounts which are either accurate or comprehensive enough to make any sort of a fair average. In the second place those who do keep costs on a systematic basis are not any too willing to divulge them.

So-called normal costs, even when honestly compiled by the most earnest and learned operators, are useless to owners or prospective operators who do not know how near or how far above or below this arbitrary case their own costs may be. Consequently, the only safe way of predicting what operating costs may reasonably be expected from any given installation is by means of an intelligent estimate based upon the actual conditions surrounding the installation. Such an estimate is only of value to the particular installation for which it is made and is based on the principal operating conditions and by placing values upon each item in its proper degree as affected by these conditions.

Most of the basic data for such computations are definitely established or easily obtainable, involving well-defined rules of accounting and current or local prices. The factors of operating condition that must be ascertained are: The locality, road conditions, length of trip, hours of operation per day, days of operation per year, cost of garaging, a maintenance classification, driver's wages, local prices on gas, oil and running supplies, number of stops made during the trip, the interest rate problem, the insurance coverage rate, the extent to which night driving will be necessary, local taxes, fees, ferries or bridge tolls and the charge for substitute buses.

It can be seen that an estimate of the cost of operation of a bus line, to be of any value, must be made by individuals who are thoroughly familiar with all the above named factors, and who, through experience and knowledge, can place the correct value on each of the operating factors involved. They must so arrange all of the items that the result of the analysis will be both accurate and intelligible. For this reason it is not recommended that the uninitiated attempt such a task. It is far wiser to rely on the assistance of reputable concerns who have made a specialty of serving customers in this way.

While the analysis, described in a general way in the above paragraph, should be made in all cases by those trained in this art, an accounting system should be started by the operator at the very inception of the line. This should be maintained thoroughly and systematically throughout subsequent operation. Success or failure of bus operation often depends upon the use or lack of an accounting system. Since business is selling commodities and service for more than cost it follows that profit is dependent on the knowledge of cost.

If a vendor of any kind does not know his own costs he is unable to determine whether his business is a paying or losing venture. In operating a motor bus line an individual is engaged in the transportation business and is consequently competing with those who might otherwise furnish this same transportation. The success of any industrial pursuit is usually a matter of competition, and without data on what operation of his buses cost him, a man is at a competitive disadvantage. He cannot know whether he is or is not saving money by operating his own vehicles or by renting them. He cannot tell whether his equipment is the most economical for his purposes or otherwise. He has no means of knowing whether he is getting the best results from his rolling stock or whether there are needless leaks which only require the proof of excessive operating costs to point them out, where otherwise they would be unsuspected. Worse than no figures at all are incorrect ones, for without any knowledge of costs, ordinary caution would impel a conservative attitude. Bogus costs encourage price cutting and all the attending evils.

An accurate record of tire mileage must also be kept and is one of the functions of an accounting system. There is considerable discussion as to the merits and economy of various types and makes of tires. Facts which may be proved concerning a certain kind of tire when used in commercial trucking, for instance, may be entirely untrue as far as the bus field is concerned. The only way to secure the correct tire for a given service is to obtain accurate figures on a cost per mile basis. To do this requires a test of each type or make of tire.

Driving has considerable effect on the operating expenses of buses. A skillful driver may keep certain costs down to a minimum, while others may prove themselves an actual liability to their employers. Again, one make of vehicle may out-perform another of similar type and capacity, and as earnings are dependent to a great extent upon performance, the operator must assure himself that this superior performance is not made at the sacrifice of economy. In summary, the vehicle which will prove the most efficient and consequently the one on which to standardize, is that type and make of bus which will earn the most money for its owner through the longest period of years. Bad driving will be reflected in the cost sheet, and with this in mind the value of the segregation of costs for each bus, where the system is employed of keeping drivers on particular buses, is apparent.

Motor bus operating costs are commonly divided into three classes, fixed, maintenance, and running charges. For complete costs it is necessary to add administrative and operative overhead. As overhead is really part of the accounting of the business proper it will not be discussed here.

Fixed Charges

Fixed charges, with one exception, are those that do not vary from day to day, that is, they go on whether the bus is in use or not. The exception is amortization. The other fixed charges are interest, insurance, and license fees.

Amortization

Since all machinery wears out in time and can be liquidated at its real value, depreciation should be allowed for, otherwise, the time will come when the owner finds that his investment has vanished. To allow for this, a depreciation charge is made so as to build up a sinking fund from the earnings of the bus, which will replace the investment when it is worn out. This method of self-maintenance is called amortization, a word which means to live perpetually. Amortization is also defined as a pro-rated renewal charge. With an ideal amortizing method it will be found that the amortization fund will equal the original investment at the time when the bus is worn out and no longer economical to operate. Motor buses are commonly amortized on two bases, time and mileage.

Years ago, when the motor bus was still in the experimental stage, it was quite proper to amortize motor equipment on a time basis for it became obsolete within a comparatively short time. Today, however, the basic engineering principles are practically established and obsolescence is no longer as important a factor as it was. The accepted modern method of amortizing a motor bus is on the *mileage* basis. Conservativeness places the life of a bus for amortization purposes, at from 100,000 to 300,000 miles.

It is apparent that the life of a bus running over a concrete roadway will be greater than that of the same bus running over a cobble-stone street. Likewise, it is reasonable to suppose that a poorly-designed, cheap bus will not have the life of a high-quality vehicle. Therefore, in determining on the depreciation that will be used, such facts as these should be taken into consideration.

Opponents of the mileage basis for amortizing claim that a bus after a year's use, has not the same resale value as appears upon the books and that their method, based on time, is more accurate. This is true, but they forget that a going concern values its property, not at market price, but at its value to the business. It is an accepted accounting practice to enter property on the latter basis.

Mileage Basis

By employing the mileage amortization method, every mile the bus travels is paid for, theoretically at least, and the sum invested. In this way the original investment is gradually reduced so that at the end of the estimated life of the bus, there has been set aside an amount sufficient to replace the equipment when necessary. By investing the amortization fund it brings in an income which should be credited to the bus. In actual practice this is rather complicated and to make it more simple this income is credited to interest by charging interest at the legal rate on the *average investment.* Amortization is computed on the basis of net investment, that is, the total investment less the cost of tires, as the tires do not depreciate at the same rate as the chassis.

Compromise Method

There is still a third method of amortizing the investment, namely, a combination of the two methods described. This was originated to care for buses that travel but a limited distance over a long period of time. Being a compromise, this method has all the short-comings of the originals. As may be surmised, this method does not necessarily result in greater accuracy. Cases of the kind under consideration are rare but can readily be cared for on the same basis as is the ordinary bus. A bus that is not being operated will last indefinitely, providing it is properly stored. It, therefore, follows that a bus wears in proportion to the work done. For this reason, the mileage basis is the only one to use in amortizing any bus.

"Never Wear Out" Theory

One will sometimes find a person who claims that a bus properly maintained and repaired will never wear out, and therefore should not be depreciated. Such an individual loses sight of the fact that the wearing action will affect every part of the bus and that in time the cost of maintenance and repair will be more than the work done is worth. When a bus reaches this stage it is far more economical to scrap it and buy a new vehicle.

Diminishing Depreciation

There are still persons that advocate diminishing depreciation; this in contrast with uniform depreciation. Proponents of the former method reason that because the bus diminishes more in selling value the first year than the second, depreciation is greater the first year than the second. Here again the market value theory is brought in. As has before been stated, book value or value to the concern, rather than market value, should be considered. On the market value basis the bus would have to carry a tremendous depreciation charge the first few months, for during this time the market value would drop with great rapidity. Depreciation on this basis would be so great that no matter how economically the bus was run it could not justify the charge. This would be bleeding the investment. Later on the depreciation would be so small that the bus would be making abnormal profits. In the end the result will be the same as though depreciation were uniform, but this method, in addition to being bad accounting, is quite complicated. It also is based on an incorrect premise, namely, market value.

Interest

Buying a bus is making an investment. It is necessary to take from the business, either as cash or credit, a certain sum of money. Like all sound investments this money should have an earning capacity of at least the rate it would cost to borrow a similar sum.

Under the discussion on amortization, it was stated that interest should be charged at the legal rate on the *average investment,* that is, the total investment divided by two. Charging interest on the total investment would be proper if the bus were credited with the interest earned by the sinking fund. But inasmuch as the interest earnings of the sinking fund are not carried as a separate item it would bleed the investment to charge interest on the total amount. Since the amount of the total investment decreases proportionately as the sinking fund increases, the sum of both will always equal the original investment. Likewise the interest of both will always equal that of the original investment. Therefore when interest is charged on the average investment, the interest charge of the original investment is automatically credited with the interest earnings of the sinking fund. It is for this reason that interest, in bus accounting, is based on the average investment.

Insurance Necessary

Motor bus insurance is as necessary to efficient operation as gasoline, oil and repairs. One might economize on drivers by hiring irresponsible men at low wages, but it would be a penny wise and pound foolish expedient, for a cheap driver would soon incur extra repair and operating costs, not to speak of possible expensive lawsuits that would pay many times the difference between his wages and those of a first class man.

Whether a man actually carries insurance on his buses or not, the risks he runs every hour he operates his buses cost him money, just the same. Buses do catch fire, occasionally, despite the most rigid precautions. Garages burn; parts are stolen from the buses; vehicles are stolen; buses will collide at times; and even the most careful drivers will occasionally damage the property of others and may even injure persons.

Insurance Charge Good Accounting Practice

Some prefer to gamble with fate and meet these expenses when they occur. Some who are born under the constellation of the horseshoe or the four-leaf clover escape these contingencies for long periods; but, by the immutable law of averages, even these will eventually face the unforeseen misfortune and the average owner may expect to encounter them in the natural course of events. Those who do not take out insurance are really carrying their own insurance and any conscientious public accountant will enter a charge for insurance against the bus.

Carrying Own Insurance

Some large concerns, whose resources permit, prefer to carry their own insurance, and a competent accountant will enter a charge for this risk on the cost ledger. This practice is permissible with such concerns, inasmuch as insurance so carried, under average conditions, should cost slightly less than regular insurance taken out with a recognized company, since the insured must necessarily be charged a sufficient premium to cover a pro-rata charge for an insurance company's expenses; but because no concern can be sure that its insurance claims will not exceed the average, it may cost considerably more to insure one's own buses than to take out a regular policy. However, a distinct advantage is gained in the operator carrying his own insurance policy, as he would be more interested in reducing possible accident claims against the line than if the payment of such claims was left entirely to an insurance company. Furthermore, he would take greater pains in coaching his drivers on the safety factor, in order to prevent any drain on his own resources through accident claims caused by careless driving.

Insurance is an Operating Cost

Many bus operators do not insure their buses and therefore omit insurance from their operating costs. However, whether they actually insure their buses or not, insurance at standard rates should always be charged against the bus.

Five Types of Insurance

There are five insurance coverages written for motor buses. These cover two broad classes of risks, namely, risk of direct pecuniary loss to the owner of the bus and loss to others for which the owner may be liable. These risks are, in the first class: fire, theft, transportation, and collision; in the second class, they are property and personal damage, known respectively as Property Damage and Public Liability.

Value of Insurance

There are many users who insure inadequately. Many, in buying a bus on time payments, take out only the insurance required by the seller of the bus. However, no operator can afford to carry on his own shoulders the risk involved in operating a bus, for in case of a collision involving, perhaps, hundreds of dollars in damages, he is unprotected. Sometimes such collisions are the fault of another who runs into the bus, but the collection of damages from the other fellow is not often an easy matter. Frequently the other fellow has not sufficient resources to pay the damages and it is seldom possible to prove the fault of the miscreant. Collision insurance may seem expensive, but it is necessary and well worth the charge made, when the protection offered is considered. Because of the large number of claims for minor damages, such as scratching of painted surfaces, the insurance companies will write only collision insurance with a $100 deductible clause, which means that the first $100 in any accident as a result of a collision is borne by the operator and the balance by the insurance company.

Property Damage Insurance

With the present attitude of courts and juries toward all motor vehicles, it is the part of wisdom for motor vehicle owners to protect themselves against liability. It is truly remarkable to note the increased value of property after it has been damaged by collision with a motor bus.

Public Liability Insurance

Even greater risks are run in injuring persons. Police everywhere are lax in the enforcement of traffic regulations in regard to pedestrians, even in the few places where any regulation of pedestrian traffic is attempted. There are lawyers who make a profession of chasing ambulances and find a lucrative business in prosecuting suits for damages to persons who are struck by motor vehicles. Everywhere the newspapers make a great issue of casualties in which motor vehicles are involved, almost universally condemning the motor vehicle regardless of circumstances. Public liability insurance relieves the operator of the liability of paying for the result of accidents to and claims of his passengers, up to the amount of his own insurance, and such insurance is usually written to cover him for the largest possible amount that will have to be paid to one passenger. The size of policy will depend more or less on the conditions of the operation in different localities, but the most popular is an insurance of $10,000–$50,000. Such a policy guarantees that the insurance company would pay any individual claims that they deemed necessary or that were awarded by a court, up to $10,000 and would pay gross claims against all occupants of the bus up to $50,000. This can be considered very good protection, although it must be understood if any one occupant gets a judgment for a greater amount than $10,000 or the entire number of those injured in the bus got judgments in excess of $50,000, the difference would have to be made up by the operator.

Insurance Protects Operator

The insured operator is protected against loss from public liability and property damage claims. He is furthermore saved the expense of litigation, insurance adjusters often settling cases out of court that would stir up nasty publicity if brought to the bar. A property damage and public liability policy therefore is not alone a safeguard against damages, but is in effect a retainer for a large and expert claim department operated by the insurance company for its own and the policyholders' protection.

City and Country Work

Whether the same amount of insurance should be carried for city and country work, must be determined by the operator, and his judgment should be based on the conditions under which he will operate. For instance, in operating in the country on an interurban run on narrow roads where extremely steep grades and sharp curves are encountered, the chances for accident are naturally greater than on open, wide, straight boulevards.

In addition to the matter of protection to the operator, the fact that he carries insurance for the protection of his riders, influences many riders in his favor that might otherwise be hesitant about riding in the bus, and the operator who is fully protected should give publicity to this fact.

License Fees

License fees and taxes, being incurred by the bus, are directly chargeable to it. Under this heading should be included the state fee, city fee, if any, and special fees. If the driver's license is paid by the operator it also should be charged to the bus.

Maintenance Charges

Maintenance charges are partly dependent upon time and partly upon mileage. This group also has one exception, the garage charge. The remaining items coming under the heading of maintenance are, tires; chassis repair; painting; chassis overhaul; lubrication; inspection and adjustment; and substitute vehicle rental. It will be noted that each item is basic in its effect upon the condition of the bus, hence the term maintenance. The more nearly ideal each of these items is, the lower will be the maintenance charges.

Garage

The garage cost continues whether the bus is working or not. It is governed solely by the time factor. Garaging charges are determined in several ways, rental, apportioned according to size of vehicle, and type of service. If space and service is bought, each bus should be charged with the expense it incurs. If the garage belongs to the operator the bus should be charged with the standard items that make up the cost of owned property, such as interest, taxes, insurance, upkeep, light, heat, power, etc.

Perhaps the fairest way to apportion the garage charge is on the basis of space required. Such a method involves a little more work than does a flat rate per vehicle. An operator usually feels that the difference is so small that it is unnecessary to use the more exact method. Since no one method is standard the way most convenient to the operator may be followed.

Where a bus is washed and polished it should be charged with the cost of individual operation for the difference in each case will come to an appreciable amount in a year. The charge for this service should be made part of the garage charge.

Tires

It was stated in the discussion on amortization that this item was calculated on the basis of net investment, which is total investment less cost of tires. Tires wear so much quicker than does a bus that to amortize their cost on the same basis as the bus would give them a life much in excess of that which they have. Because of this difference tires are depreciated separately.

As the exact mileage of a tire cannot be determined when it is new and as it is advisable to fix a per mile cost so that the cost of operating may be approximated within narrow limits, two methods are used in making the estimate. The first, and more conservative method is to divide the original cost by the adjustment mileage, usually 7000 miles; the second, and more common method is to divide the original cost by the mileage based on experience. Because the estimated life, in the second method, is longer than in the first, the cost per mile will be less.

In both methods, however, no account is taken of the cost of repairs. Therefore, before a true tire cost can be determined, it is necessary to know the actual tire mileage and the repair charges. These can only be had after the tire has served its economic life. Actual tire costs can, therefore, only be determined after the tire is finally disposed of.

In large operations many of the operators purchase their tires from the tire companies on a mileage contract basis. This method of purchasing tires assures the operator in advance, of his cost per mile and if he makes it a part of his contract, and is in a community large enough for the tire company to maintain service, he is often relieved of the cost and trouble of repairs.

It is undoubtedly true, however, that an operator will get a lower cost-mile on his tires if he buys them outright and takes proper care of them. The price on a contract basis is, of course, the average cost of a number of operators, and at such a price the careful operator pays for the carelessness of the operator who gives no heed to proper inflation, makes no inspection for small cuts and bruises, or does not instruct his drivers to be careful against rubbing tires against curbs.

Repairs

Buses, like all machinery, are made of materials that are subject to wear. Of course, the better the material and workmanship the greater will be its serviceableness. Despite the original care that good buses are given there will be times when, through carelessness, neglect, ignorance, or overloading, by owners or drivers, parts will become worn out and must be replaced. Accidents will occur and damage result.

Chassis repair is differentiated from body repair. While the chassis will have an effect on the body the reverse is not so. By keeping a separate record of each it is possible to compare different makes of chassis and their effect upon equipment. A substantially built bus will not subject equipment to the same vibration and abuse as will a cheaply constructed one.

To make this comparative study still more fundamental, ordinary cost of repairs should be divided into labor and material costs. This will show, in comparing two high grade buses, the value of accessibility as well as sturdiness of parts.

Repairs, like tires, cannot be computed exactly until the end of a definite period of time, usually one year.

Painting

Well-kept buses pay in advertising value and lowered operating costs. Drivers are more careful with, and take greater pride in, buses that are kept spick and span. If this statement needs verification, a visit to a garage is suggested. It will be found that the cars men lounge in or around are not those that are kept in the best condition but those that look most disreputable. Painting pays dividends.

It has been found to be a good practice to keep jobs at the height of their appearance at all times, and therefore an occasional color varnish job will be better than to let the paint entirely wear off until a predetermined date for a complete repainting. Not only will this practice be found cheaper but it will help to keep the bus looking spick and span at all times, and therefore have a good effect on patronage.

Chassis Overhaul

Just as a person needs a periodic visit to a dentist to prevent excessive tooth trouble, so a motor bus needs a periodic overhaul. A person is advised to visit a dentist once every three months because experience has shown that three months is not sufficient time for a tooth disease to reach a stage that cannot be remedied without long and expensive treatment.

Charges against the bus for repair costs can be entered at the end of each month when charges for repairs are collected from the shop and bills are paid. Obviously, this method will show higher costs in certain months of the year than others, when, for example, a large repair job is done, but these costs will average themselves out at the end of the year.

In connection with this it is a wise provision to divide repair costs that are a result of accident from costs that are a result of natural wear and tear. If this is not done an erroneous judgment will be reached in the comparison of two different buses.

Many bus operators have accepted the practice of overhauling their buses once every year. This cannot be adopted as a general rule, however, because different buses and different operators work under varying conditions, and with different makes of vehicles. It is obvious that an operator whose bus averages fifty thousand miles a year will need an overhauling sooner than the operator who only covers twenty-five or thirty thousand miles. However, a definite date should be set.

Application of this rule will result in lowered repair charges, for the overhaul will disclose conditions which, if cared for immediately, will cost comparatively little to remedy, but which, if allowed to continue, will necessitate heavy expenditure. Inasmuch as the benefits of the overhaul are extended over a long period the cost should be distributed over the same period and in proportion to mileage.

Lubrication, Inspection and Adjustment

To spend a few minutes in lubricating, inspecting and adjusting a bus every night will save expensive replacements during overhaul and also save large repair charges. Concerns that have adopted nightly lubrication, inspection and adjustment; the making of minor repairs such as tightening of brakes, setting valves at proper clearance, tightening spring clips, etc., find that their overhaul and repair bills are much lower than those of concerns who neglect this work.

At the end of each month the actual time spent each night should be totaled and the sum made part of the maintenance and repair charge.

Substitute Vehicle Rental

Substitute vehicle rental is an item over which there is a marked difference of opinion. Some persons claim that the difference between what it costs to operate an owned bus and to hire one, should be added to the hired vehicle cost and the total charged to the disabled bus. This reasoning is based on the proposition that the owned bus while running, was earning a profit and that in becoming disabled not only makes the company go to the expense of hiring a bus but wipes out the profit the owned bus normally made. Other persons do not charge substitute vehicle rental against a bus feeling that the hired bus pays for itself by doing a given amount of work. In most communities, however, it is not possible to hire a bus, and so, where the fleet is large enough, the operator himself owns vehicles to be used for substitutes. Where this is done a valuation per day should be placed on this bus, and when it is called out to replace another bus, it should be charged against the bus it replaces.

Account authorities recommend that where substitute vehicle rental is charged it should only include rental made necessary by ordinary repairs and overhaul, and that a bus so charged shall be credited with work done by the substitute.

Running Charges

Running charges are aptly named. They are the costs that are incurred only when the bus is running. Enumerated, they are: gasoline, oil, running supplies, such as cup grease, transmission oil, kerosene, etc., and drivers' wages. These items usually total more than one-third of the total cost of operating a bus. It is therefore here that one must keep especially close watch if economy is to be maintained.

Passenger Mile

The passenger mile is an arbitrary term and while not an absolute measure of work yet is commonly accepted, because it fulfills the requirements of a term for comparative purposes better than anything else suggested. Defined, the passenger-mile means the carrying of one passenger one mile. That neither the number of passengers carried or the number of miles traveled alone are satisfactory in determining bus economy in relation to performance, is readily appreciated.

Regardless of the fact that there has been much contention as to the correct method of arriving at a fair figure for unit-miles as used in trucking operations and passenger-miles as applied to bus installations, most authorities now agree that the following method has the soundest grounds and is therefore recommended.

Divide the average round trip distance by 2 and multiply the quotient by the total number of passengers carried during the day or other period. For illustration assume that a bus carried 500 passengers a day and that the average round trip is 12 miles:

Twelve divided by two, times 500 equals 3000 passenger miles.

Discussion of Cost Systems

Ever since the motor truck's inception, students have diligently studied costs. Scores of cost systems have been spread broadcast. Some originators printed their systems for free distribution and sent them out by the thousands, while others compiled elaborate outfits to be sold at fancy prices. Associations, through special committees, studied the subject; important trade publications evolved so-called standard systems; tire and bus manufacturers employed expert accountants to tabulate statistics and compile systems; advertising literature glowed with impressive arrays of figures; but, nowhere could two separate cost statements be directly compared. No two estimates included all the items necessary or computed them in quite the same way. Nearly all compilations and systems showed, on study, that certain important items had been omitted. Nowhere were the methods of figuring depreciation, interest, overhead, or performance uniform.

Some depreciated according to mileage, using as a basis, total investment, while others depreciated according to time, using as a basis, net investment. Some charged interest on the total investment, others on net investment, and still others used a sliding scale. Some included administrative overhead while others did not.

And, as to performance—the term unit-mile slid glibly from many tongues and yet nowhere was there any agreement as to what this term meant or how it should be computed.

Gradually those most interested in the subject came to realize the ineffectiveness of the wide divergence of opinion. Instead of each "expert" trying to outshout his rival there arose a desire to evolve something that would be sufficiently simple to meet the requirements of the small operator and yet be comprehensive and standard. Users had a similar desire.

Truck Owners' Conference System

This wish was finally answered in a series of Truck Owners' Conferences held in a dozen or more of the principal cities of the country during the past four years. At the conferences was brought forth the National Standard Truck Cost System. Since its initial appearance, thousands of copies of the system have been sold to as many operators. Truck and tire manufacturers have abandoned their own systems to adopt the new. Newspapers and magazines everywhere have published articles about the system. Even so impartial an organization as the National Automobile Chamber of Commerce, the official automotive vehicle manufacturers' organization, has, in recent months, adopted the system as standard for the motor truck industry.

Copies of the National Standard Truck Cost System can be procured, at a small cost, from the Truck Owners Conference, Inc., 5 South Wabash Avenue, Chicago.

How It Differs

One may advisedly ask how the new standard system differs from its unsuccessful predecessors and why it has succeeded where others have failed. Primarily, its success is attributed to the fact that it originated at a conference at which were many experts with many points of view. It was not produced as a business enterprise but solely as a service to operators of motor trucks and is distributed at the cost of publication. It is distributed by truck and tire manufacturers, publishers, magazines, and by the conference proper. Some manufacturers are distributing them as standard equipment with their trucks.

In itself, the system represents a distinct advance over any similar attempt, not only in its origin and distribution, but in many of its accounting features. Old moss-encrusted traditions of motor truck accounting have been eliminated. It is not permanent in form but is subject to annual revision by a committee of experts representing varied interests, so that it may be kept up to date and accommodated to changes in conditions as time goes on.

The National Standard Truck Cost System

Any good motor bus cost system should combine accuracy, simplicity, and ease of operation. Accuracy is essential if the system is to be of value; simplicity is desirable in order that the average person, without special accounting training, may be able to quickly acquire the ability necessary to keep the records; and ease of operation is necessary so that the time required to record the data be brief.

Unfortunately, the Conference has not as yet found it possible to publish a cost system exclusively for bus operation, but on the other hand the elements involved differ so slightly that the truck cost system can be used to the best advantage with but little change in the forms which comprise the accounting system.

In the simpler outfits, the National Standard Truck Cost System is bound in a manila-covered folder of letter size and shape so that it can be readily filed in any standard file. The back cover is about one-fourth inch longer than the front. This extension or lip gives the number of the bus and also the year for which the record is kept. This lip acts as a file guide in locating the record of any particular bus while in a file.

On the front page of the cover are found spaces for the bus owner's name and address, also who installed the system or from whom it was bought. At the bottom of this page will be found a table headed, Recapitulation by Years.

Forms 1, 2, 3, and 8 are bound in the folder. The folder sells for fifty cents. Form 4 is sold in pads, 365 being necessary for one bus for one year. These are printed on both paper and cardboard. A set of the former costs $.75 and a set of the latter $1.25.

More elaborate outfits for big fleets of buses are made in loose-leaf form, the sheets being kept in loose-leaf ring binders. Prices vary with the quality of the binders.

Form 4

Form 4, the Daily Service Record, is carried and filled out by the driver who turns it into the garage or office at the conclusion of the day's work. A new form is used for every working day. This form gives the fundamental operating data. While the Truck Owners' Conference, the body that promulgated the standard system, has adopted a definite form for the driver, users of the system may rearrange the form's layout and make additions if they find it necessary. Omissions, however, should not be made as they will affect the other forms. This form is reproduced.

Form 1

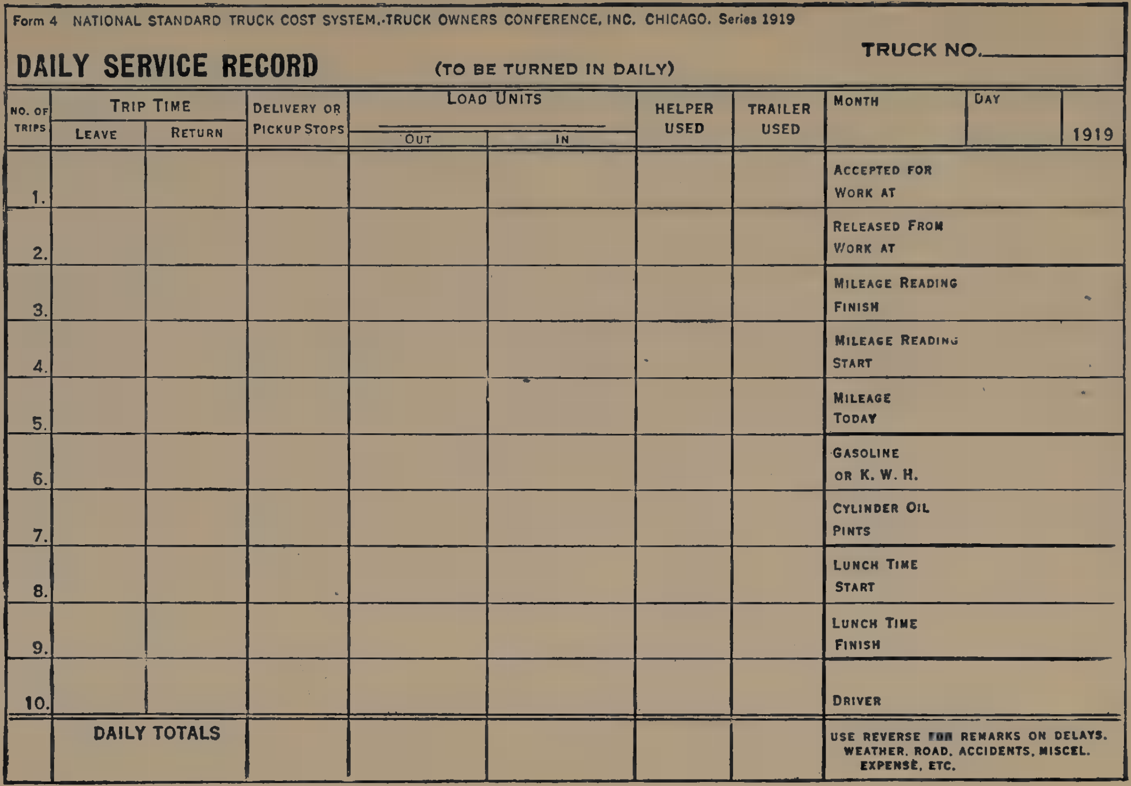
Information found on the Daily Service Record (Form 4) is totaled and posted to Form 1, the Daily Record. This is the first form found in the folder. It provides space for thirty-one entries, one for each day in the month. It is also divided into two parts, the first being headed "Operating Data" and the second "Cost Data." The details for the operating data section are secured from the form the driver turns in daily. Items such as gasoline, oil, etc., which are given in quantities, on the Daily Service record, are translated into values in the cost data section. In this section are also found entries for costs of repairs which are determined from invoices if the work is done by an outside repair shop, or from garage records if done in a private shop, and substitute vehicle rental. Each folder contains twelve Daily Record Sheets, one for each month in the year. This form is reproduced.

Form 2

In addition to the spaces for the daily entries the Daily Record provides spaces for totals where the sums of the various items are entered at the end of the month. These totals are then posted to Form 2, the Monthly Analysis of Operation. This form condenses the daily operations and makes it easy to compare one bus with another. This form is reproduced.

Form 2 is divided into two parts, the upper part showing the totals carried over from Form 1, and the lower part being averages of the data found in the upper part. To illustrate this relation take the second item, lettered B, in the upper part and its average, lettered B 1, in the lower part. Item B is "Number of Round Trips" and represents all the round trips made during the month. Item B 1 is "Round Trips per Day" and is found by dividing the total number of round trips made during the month by the number of days that the bus was run.

Each item in Form 2 is lettered. The items that are averages of totals are marked with the same letter carried. Of course, those items not applying to bus operation may be left blank, such as Delivery and Pick-up stops. These letters are used in the folder section headed



Form 4 NATIONAL STANDARD TRUCK COST SYSTEM.-TRUCK OWNERS CONFERENCE, INC. CHICAGO. Series 1919

DAILY SERVICE RECORD (TO BE TURNED IN DAILY) TRUCK NO.________

NO. OF TRIPS	TRIP TIME		DELIVERY OR PICKUP STOPS	LOAD UNITS		HELPER USED	TRAILER USED	MONTH	DAY	
	LEAVE	RETURN		OUT	IN					1919
1.								ACCEPTED FOR WORK AT		
2.								RELEASED FROM WORK AT		
3.								MILEAGE READING FINISH		
4.								MILEAGE READING START		
5.								MILEAGE TODAY		
6.								GASOLINE OR K. W. H.		
7.								CYLINDER OIL PINTS		
8.								LUNCH TIME START		
9.								LUNCH TIME FINISH		
10.								DRIVER		
	DAILY TOTALS							USE REVERSE FOR REMARKS ON DELAYS. WEATHER. ROAD. ACCIDENTS, MISCEL. EXPENSE, ETC.		

FORM 4.

Form 1 NATIONAL STANDARD TRUCK COST SYSTEM TRUCK OWNERS CONFERENCE, INC., CHICAGO.

DAILY RECORD, MONTH OF _______________; HOURS IN WORKING DAY _______ FROM ____________ TO ____________ TRUCK NO. _______

OPERATING DATA																COST DATA										(POSTED TO FORM 3C)
DATE	WEATHER	TEMPERATURE	NUMBER OF TRIPS	DELIVERY OR PICK-UP STOPS	TOTAL UNITS (SEE D)		MILES	TIME IN HOURS AND MINUTES								GASOLINE OR CURRENT		CYLINDER OIL		DRIVER COST	HELPER COST	COST OF REPAIRS				SUBSTITUTE VEHICLE RENTAL
					OUT	IN		AVAILABLE BUT NOT USED		LOADING		RUNNING INCLUD. STOPS		LAID UP FOR REPAIRS		GALS. OR K.W.H.	COST	QUARTS	COST			ORDINARY			ACCIDENT	
								HRS.	MIN.	HRS.	MIN.	HRS.	MIN.	HRS.	MIN.							MATERIAL CHASSIS	LABOR CHASSIS	LABOR AND MATERIAL BODY	BODY AND CHASSIS	
1																										
2																										
3																										
4																										
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28																										
29																										
30																										
31																										
TOTAL																										

FORM 1.

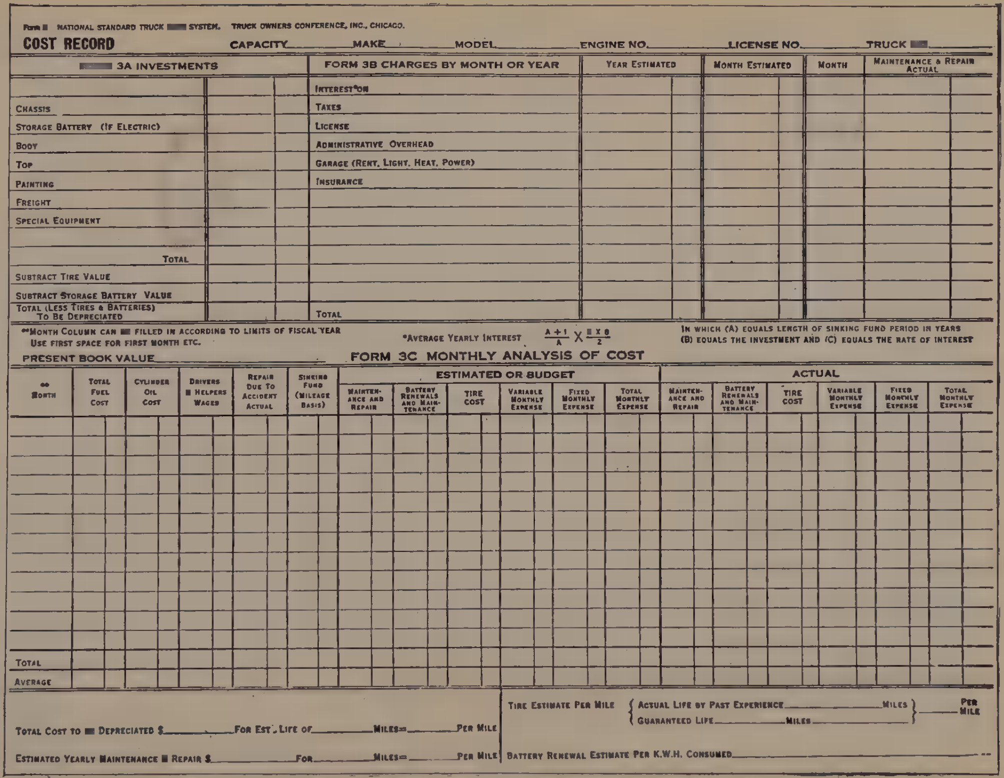
Form 2 NATIONAL STANDARD TRUCK COST SYSTEM. TRUCK OWNERS CONFERENCE, INC., CHICAGO.

MONTHLY ANALYSIS OF OPERATION

________ CAPACITY ________ MAKE ________ **FISCAL YEAR ________ TO ________ TRUCK NO. ________

	**Insert First Month of Fiscal Year in Heading of First Column, etc.													6 Mos Total or Average	12 Mos Total or Average
A.	Number of days operated														
B.	Number of round trips														
C.	Delivery or pick-up stops														
D.	Total units ______ out														
E.	Total units ______ in														
F.	Miles traveled														
G.	Gallons of gasoline or K. W. H. current														
H.	Quarts of Cylinder Oil														
I.	Hours available but not used														
J.	Hours loading														
K	Hours running including stops														
L.	Hours laid up for repairs														
■.	Hours with helper														
N.	Trailer data														
	AVERAGES FROM ABOVE														
B 1	Round trips per day														
C 1	Delivery ■ pick-up stops per day														
D 1	Total units ______ per day														
E 1	Average units ______ per trip														
E 2	Unit ______ miles per day														
F 1	Miles traveled per day														
F 2	Average round trip distance														
G 1	Miles per gal. of gasoline ■ per K. W. H.														
H 1	Miles per gallon of cylinder oil														
J 1	Average hours loading per day														
J 2	Average minutes loading per trip														
K 1	Average hours running including stops per day														
K 2	Average hours in service per day														
P.	Average speed in miles per hour														
Q.	Estimated running time per mile														
R.	Estimated time per customers stop (in min.)														
S.	Cost per day operated														
T.	Cost per mile														
U.	Cost per unit ______														
V.	Cost ■ unit mile														

FORM 2.



Form [redacted] National Standard Truck [redacted] System. Truck Owners Conference, Inc., Chicago.

COST RECORD CAPACITY______ MAKE______ MODEL______ ENGINE NO.______ LICENSE NO.______ TRUCK [redacted]______

[redacted] 3A INVESTMENTS			FORM 3B CHARGES BY MONTH OR YEAR	Year Estimated	Month Estimated	Month	Maintenance & Repair Actual
			Interest*on				
Chassis			Taxes				
Storage Battery (If Electric)			License				
Body			Administrative Overhead				
Top			Garage (Rent, Light, Heat, Power)				
Painting			Insurance				
Freight							
Special Equipment							
Total							
Subtract Tire Value							
Subtract Storage Battery Value							
Total (Less Tires & Batteries) To Be Depreciated			Total				

**Month Column can [redacted] filled in according to limits of fiscal year
Use first space for first month etc.

*Average Yearly Interest $\frac{A+1}{A} \times \frac{B \times C}{2}$

In which (A) equals length of sinking fund period in years
(B) equals the investment and (C) equals the rate of interest

PRESENT BOOK VALUE______

FORM 3C MONTHLY ANALYSIS OF COST

** Month	Total Fuel Cost	Cylinder Oil Cost	Drivers [redacted] Helpers Wages	Repair Due To Accident Actual	Sinking Fund (Mileage Basis)	ESTIMATED OR BUDGET						ACTUAL					
						Mainten-ance and Repair	Battery Renewals and Main-tenance	Tire Cost	Variable Monthly Expense	Fixed Monthly Expense	Total Monthly Expense	Mainten-ance and Repair	Battery Renewals and Main-tenance	Tire Cost	Variable Monthly Expense	Fixed Monthly Expense	Total Monthly Expense
Total																	
Average																	

Total Cost to [redacted] Depreciated $______ For Est. Life of______ Miles=______ Per Mile

Estimated Yearly Maintenance [redacted] Repair $______ For______ Miles=______ Per Mile

Tire Estimate Per Mile { Actual Life by Past Experience______ Miles / Guaranteed Life______ Miles______ } ______ Per Mile

Battery Renewal Estimate Per K.W.H. Consumed______

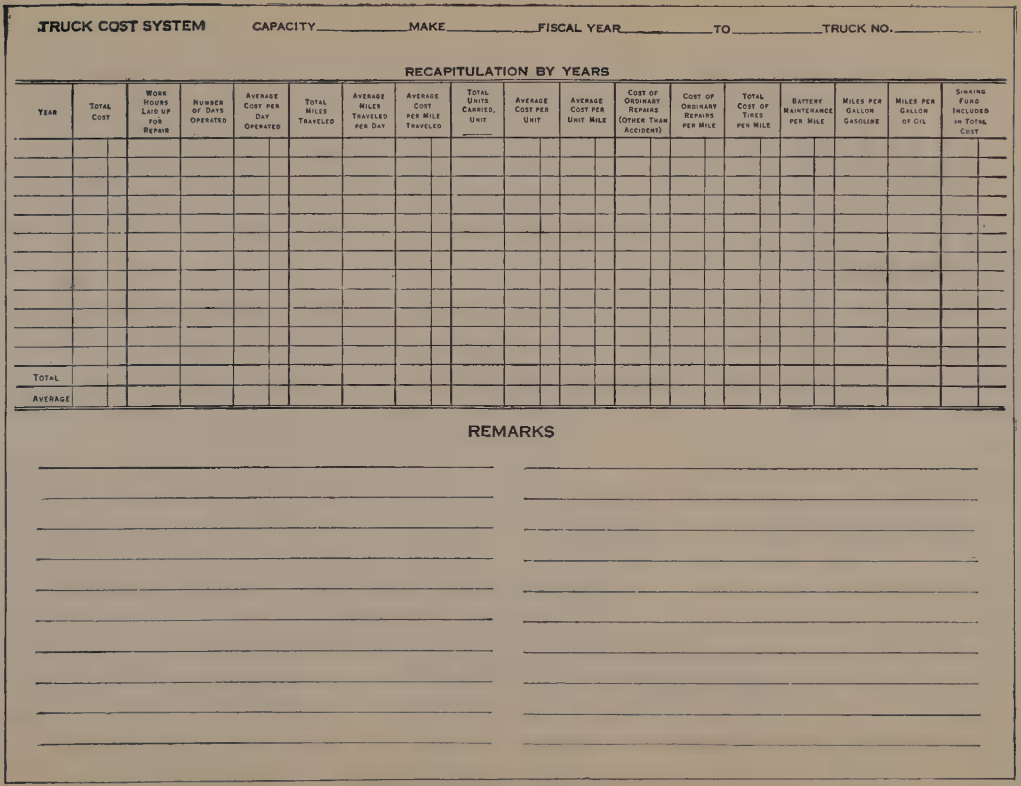
FORM 3.

Form [redacted] NATIONAL STANDARD TRUCK COST SYSTEM. TRUCK OWNERS CONFERENCE, INC., CHICAGO.

TIRE RECORD, [redacted] OF TRUCK__________ TRUCK No.__________ CAPACITY__________ SIZE OF TIRES FRONT__________ REAR__________

Tire, Wheel or Serial Number	Location	Make	Type	Size	Tire Taken From	Order Number	Initial Tire Value	Tire Mileage When Applied	Date On	Mileage Reading	Date Off	Mileage Reading	Elapsed Mileage	Cost of Repairs	Cost of Replacement	Disposition	Total Cost	Cost Per Mile

FORM 8.



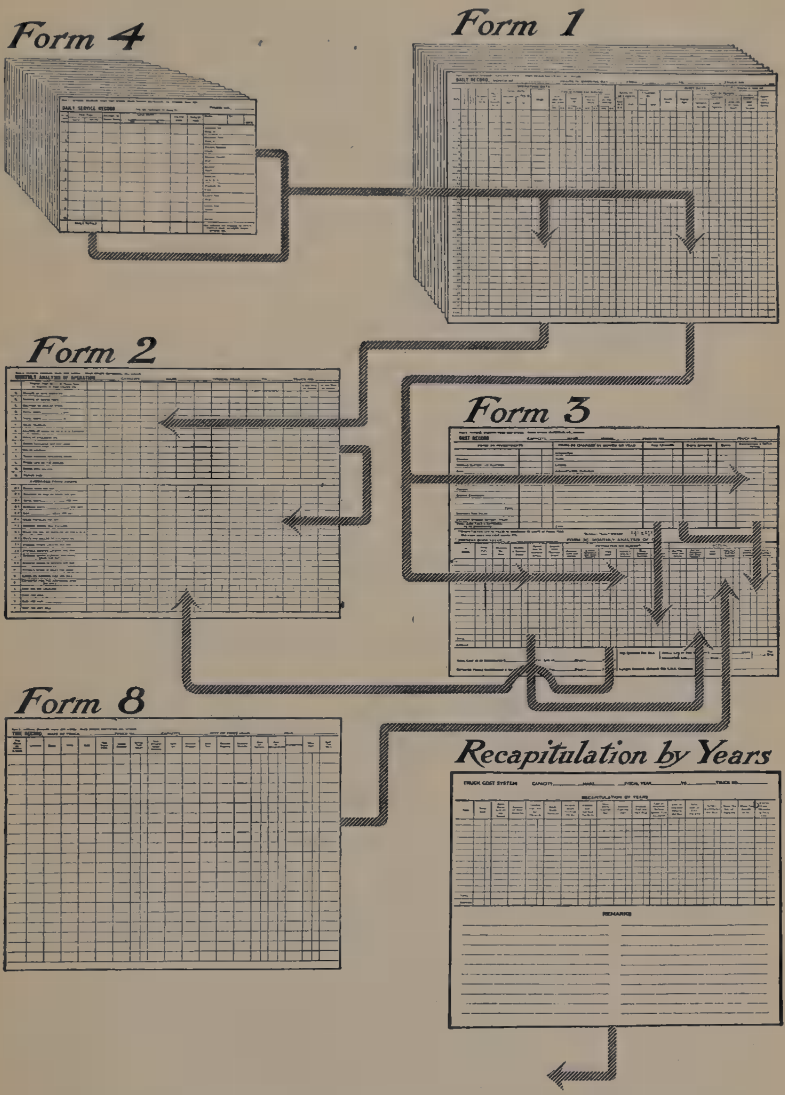
TRUCK COST SYSTEM CAPACITY________ MAKE________ FISCAL YEAR________ TO________ TRUCK NO.________

RECAPITULATION BY YEARS

Year	Total Cost	Work Hours Laid up for Repair	Number of Days Operated	Average Cost per Day Operated	Total Miles Traveled	Average Miles Traveled per Day	Average Cost per Mile Traveled	Total Units Carried, Unit	Average Cost per Unit	Average Cost per Unit Mile	Cost of Ordinary Repairs (Other than Accident)	Cost of Ordinary Repairs per Mile	Total Cost of Tires per Mile	Battery Maintenance per Mile	Miles per Gallon Gasoline	Miles per Gallon of Oil	Sinking Fund Included in Total Cost
Total																	
Average																	

REMARKS

YEARLY RECAPITULATION FORM.



HOW THE VARIOUS FORMS USED IN THE NATIONAL STANDARD TRUCK COST SYSTEM COMBINED TO MAKE A COMPLETE RECORD SYSTEM.

"National Standard Truck Cost System—Directions" where the method of determining and posting each item in Form 2 is explained.

Cost per day, per mile, per unit, and per passenger mile, are also found in Form 2. These data are derived by dividing the total monthly cost, as shown in the Daily Record, by the number of days worked, miles traveled, or passengers carried.

Cost Record

Form 3, the Cost Record, consists of two main tables. The first table is subdivided into two sections known as Form 3 A and Form 3 B, respectively. The second table is known as Form 3 C. This form is reproduced.

Form 3 A is an investment chart serving as a basis for fixed expense. Here are enumerated all the items that make up the investment. Form 3 B is a chart for computing fixed monthly and yearly expense. The item amortization, or sinking fund as it is called in the National Truck Cost System, is not listed as it is carried as a separate item in Form 3 C. Form 3 B also provides space for the entry of the amounts spent each month from maintenance and repair. It is not necessary to adjust these expenditures on a mileage basis here as that is done in Form 3 C. Interest is calculated by the National Standard Truck Cost System. This method of calculating this item is rather involved and the operator is, therefore, recommended to use the method advocated on page 186 viz., average investment.

Monthly Analysis of Cost, as Form 3 C is known, is devised to record the estimated and actual expenses by months for one year. Its totals are the final step in the folder, unless one uses them to find the same cost items that are given in Form 2, namely, cost per day, per mile, per passenger, and per passenger mile based on yearly costs. It has been stated that such items as repairs and overhaul cannot be computed with exactitude until the conclusion of a certain period of time, usually a year, even though it is not only advisable, but often essential that an approximate cost be known. It is for this reason that the budget section is included in Form 3 C. While careful approximations are fairly satisfactory for certain things it is much better to have exact figures. These are supplied at the close of each year, in the section of Form 3 C headed "Actual."

Form 8—Tire Record

Form 8, the Tire Record, is the last form in the folder. Tire costs form so large a part of the cost of motor bus operation that it pays to keep an accurate account of them. The Tire Record is the simplest tire chart as yet devised. It meets the need of the small operator who wants to make the fewest possible entries necessary to accurately determine his tire costs. It also keeps together all tire records of one particular bus and thus easily gives its actual cost of tires for comparison. This form is reproduced.

Entries to Form 8 are made from garage time sheets or from driver's Daily Service Record. The total cost is posted to form 3 C.

Forms 5, 6 and 7 are also concerned with tire data. They merely amplify some of the items used in Form 8. Their use is optional as they are suggested and not standard. Their omission has no effect upon the system proper.

Recapitulation by Years

On the front cover of the folder is a chart headed "Recapitulation by Years." Here the yearly operation data and costs are entered for each year the bus is in service. It tells at a glance how many years the bus was

Form 1314-Class 1191

THE YOUNGSTOWN MUNICIPAL RAILWAY COMPANY

DETAIL BUS OPERATING REPORT...192.....

		The Youngstown Municipal Ry. Co.		New Castle City		Total This Month	INCREASE (Decrease in Red)	........Months Ended ....192....	INCREASE (Decrease in Red)	
	OPERATING REVENUES									
	Passenger Earnings—Cash and Ticket									
	Passenger Earnings—Transfers									
	Rent of Equipment									
	Special Bus Revenue									
	TOTAL									
	OPERATING EXPENSES									
	Maintenance, Way and Structures									
	Maintenance of Equipment									
	Conducting Transportation									
	Traffic									
	General and Miscellaneous									
	TOTAL									
	NET EARNINGS									
	DETAIL EXPENSES									
	MAINT WAY & STRUCTURES									
	824 Repairs to Garage Buildings									
	TOTAL									
	MAINT OF EQUIPMENT									
	829 Superintendence									
	830 Repair Chassis									
	831 Repair Bodies									
	832 Tire Repairs and Renewals									
	833 Accessories									
	837 Shop Expenses									
	TOTAL									
	CONDUCTING TRANSPORTATION									
	863 Superintendence									
	864 Chauffeurs Wages									
	867 Miscellaneous Service Expense									

	876 Lubricating Oil																	
	873 Miscellaneous Transp. Expense																	
	TOTAL																	
	TRAFFIC																	
	880 Advertising																	
	TOTAL																	
	GENERAL & MISCELLANEOUS																	
	883 Salaries, General Officers																	
	884 Salaries, General Office Clerks																	
	885 Office Supplies and Expenses																	
	889 Miscellaneous																	
	892 Liability Insurance																	
	893 Fire Insurance																	
	894 Stationery and Printing																	
	895 Store Expenses																	
	898 Rent of Equipment																	
	899 Rent of Garage																	
	883b Salaries and Expenses of Comm.																	
	884b Sal. and Exp. of Comm. Office.																	
	885b Comm. Office Supplies and Exp.																	
	889b Misc. Comm. Office Sup. and Exp.																	
	TOTAL																	
	TOTAL OPERATING EXPENSES																	
	STATISTICS																	
	Coach Mileage																	
	Coach Hours																	
	Paid Fares																	
	Gross Earnings Per Coach Mile																	
	Oper. Expenses Per Coach Mile																	
	Net Earnings Per Coach Mile																	
	Depreciation Per Coach Mile																	
	Taxes Per Coach Mile																	
	Interest Per Coach Mile																	
	Total Deductions Per Coach Mile																	
	Profit From Oper. Per Coach Mile																	
	Interest																	
	Depreciation																	
	Taxes																	
	PER CENT OPERATING EXP.																	

HOW ONE OF THE LARGEST BUS OPERATING TRACTION COMPANIES SHOW THEIR MONTHLY OPERATING FIGURES.

in use, what it accomplished, and what it cost. It is an excellent means of comparing one bus with another when a number of years is involved. This form is reproduced.

Most of the traction companies throughout the country have standardized on their method of keeping costs for their trolley cars, and it seems to be the logical thing for them to continue with the method that they have been using in keeping their bus costs. Such a uniform system enables them to make comparisons with other companies using the same method, taking into consideration of course the different conditions under which the two fleets of buses may operate.

The Youngstown Municipal Railway Company, of Youngstown, Ohio, have taken a step in this direction, on the opposite page is shown a reproduction of the form they use as a final monthly recapitulation. The items in this form are taken from the system used for their street cars, and the numbers to the left of the items compare with their railway practice, with the exception that the figure 8 has been placed before the original numbers to show that it is a ''Bus Operation'' item.

CHAPTER IX

Selection of Equipment

ROLLING stock naturally constitutes the principal physical property in a bus transit enterprise. Its operation comprises the service, the stock in trade, of the business and therefore the fountain-head of revenue, while at the same time occasioning most of the expense. Rolling stock must therefore exert a profound influence upon the profits. This it does in two ways: By affecting the volume and character of revenue-earning traffic and by its relative economy of operating cost.

Performance capabilities, passenger carrying capacity, the degree of passenger comfort and convenience and even the external appearance also exerts a more or less controlling effect upon the routes, schedules and territories served. Altogether, there is no more important problem confronting the organizer and operator of a motor bus line than the selection of rolling equipment.

Inevitably the first aspect to receive consideration is price, since a large part of the preliminary financing must be for the purpose of purchasing the buses. While it is undoubtedly desirable to keep the purchase price as low as possible, consistent with the requirements to be met, the wise operator recognizes that the first cost of the bus equipment is of real significance only as it bears upon operating costs in the long run; that a little higher price at the outset may very easily be offset by an ultimate economy in operating cost. By holding fast to this fundamental he will be guided in his judgment of prices entirely by far-seeing economic considerations, favoring neither the lowest-priced equipment, for the sake of low initial investment, nor the highest-priced, as such.

Factors of Price

The purchase price of a motor bus depends upon three things, namely, the size and elaborateness of the vehicle and its equipment; the quality of material and workmanship entering into its construction; and the size and efficiency of the manufacturing organization marketing it. The first is obvious—a fifty-passenger double-decker, elaborately equipped and expensively finished will naturally cost more to buy than a twelve-passenger open jitney. Equally palpable is the necessity for a higher price for an article of higher quality. The last point, however, is often overlooked, namely, that the size and efficiency of a producing and merchandising organization will exert a considerable effect upon price. Designing, manufacturing, distributing and servicing operations conducted on a large scale offer opportunities for economy entirely out of the reach of organizations operating on a smaller scale. Efficiency, on the other hand, depends not so much upon size as on experience and character. Experience is necessary to the development of efficient design of product, lay-out and smooth operation of plants, economy of materials and facilities, effectiveness and avoidance of extravagance in sales efforts and skill and celerity in service activities. Character determines how high the ideals of a manufacturing organization shall be and how steadfastly these ideals are realized and adhered to. Character governs the harmony and morale of the organization, without which all else is of little use. It builds up the good will and confidence of patrons and business generally by which alone may an enterprise proceed with progressive projects and overcome the many obstacles inevitably encountered.

Purchasers of motor buses need a standard by which these things may be measured. It is hoped that the foregoing chapters of this work will have fulfilled the hopes of their authors in providing the prospective bus operator a foundation and a guide to judgment as to the general types of buses adapted to the conditions surrounding his particular venture.

Judgment of a motor bus from the standpoint of the engineering back of its design, the materials of which it is fabricated and the accuracy and perfection of the workmanship going into its construction, cannot similarly be treated in general terms. A technical treatise of sufficient depth to cover all of the considerations which might be given this topic is impossible within the compass of this work; but a few of the salient points which it would be well to bear in mind are given herein.

Judging the Maker

More intangible and elusive than either of these standards, perhaps, is the third, which may be summed up in the expression: Competence of the manufacturer. Shrewd buyers know how much importance to attach to a vendor's established reputation, its facilities, its resources, credit standing and the personal character of its personnel. They also know how baffling are appearances in many cases. The stranger to an industry must therefore select a few major reactions from which to judge in this acid test of competence. Experience must certainly constitute one of the most important considerations. Long experience presupposes long establishment, which in turn guarantees some measure of success, else the enterprise could not have survived. Here the buyer must distinguish between experience in general and experience with the particular product under contemplation. The sort of experience to be given weight, therefore, must be experience with motor buses and over a considerable period of years.

Mere time and sphere of experience alone is not sufficient, however, for unless a manufacturer's experience is broad, embracing operations on both small and large scale in big cities, small towns and open country, it will be circumscribed and of limited application. So that the scale upon which his operations are conducted becomes the second important standard for judgment of competence. The size of an organization is important also as definitely measuring the range of activities which may be conducted under its direct control and supervision. Obviously a concern sufficiently large to conduct its own researches in large and thoroughly-equipped and competently-manned laboratories will be able to select more perfectly adapted materials of construction and to control their quality and uniformity in a manner quite impossible on a smaller scale of operations. A factory turning out a large output can utilize elaborate specialized machines and fixtures which not only produce more accurate and interchangeable parts; but produce them at much lower cost than the smaller, simpler machines which alone are justified by a small output.

With the purchasing power and volume of purchases of a large producer it is reasonable to expect more economical purchasing and at the same time more rigid specifications and inspection than the small establishment can command. Many other advantages which similarly reflect advantage to the purchaser inhere to large-scale manufacture.

Character and Responsibility

Character in a business institution, no less than in an individual, is best judged by its actions, its record, its works. Reputation and good will are largely the reflection of business character. Responsibility is determined by the personnel, resources and organization of the establishment. The purchaser who is looking for a concern of high character from which to purchase his equipment will therefore give due weight to financial rating and the state of its finances. He will repose his confidence more readily in a firm which is keeping faith with its stockholders than otherwise, of course; but on the principle that a man is known by his associations, he will also inquire well into the sort of concerns with whom it does business; both those to whom it sells and from whom it buys. He will look well to the scope of its activities and to the closeness of the contact between purchaser and seller both before and after the sale.

Quality Is All-important

Quality remains for consideration. Upon experience sufficient to conceive its nature and competence to bring it to reality, quality depends. Unless these things can be established as existing in fact, it is useless to look for quality in the product. An inexperienced concern, without proper facilities, resources, character or standing, cannot conceivably produce a quality product; although it is just barely conceivable that a manufacturer established for several years, carrying on his operations on a considerable scale and giving a passable semblance of competence might produce buses of inferior quality, particularly if the manufacture of buses had been essayed comparatively recently after confining previous experience to other somewhat related vehicles.

For this reason, it is unsafe for the purchaser to ignore all consideration of the bus from a mechanical standpoint. It is the mechanical construction and this alone which produces the performance which earns revenue on the one hand and the reliability and economy on the other, the margin between which determines the profitableness of the whole enterprise.

From the foregoing it will be apparent that price in itself is not a standard by which a purchase may be governed, nor is it properly a first consideration. The first thing to be determined is the general type, size and equipment of bus or buses required. Then, having selected a certain number of manufacturers offering approximately the description of vehicle in mind, their standing in the industry, their reputation, responsibility and resources should be investigated, eliminating all who fail to measure up to reasonable standards. This is for self-protection against the orphaning of the bus after purchase by discontinuance of manufacture; undue depreciation, due to obsolescence; maintenance expense and delay due to difficulties in securing replacement parts, all of which and more are risks which are run in dealing with inexperienced, weak or unstable vendors. Such should also be eliminated because high quality products cannot be produced by such concerns except at prohibitive prices.

Service Indispensable

One other matter that should be given the most careful scrutiny by the intending purchaser is the matter of what, in the motor vehicle industry, is known as service, by which is meant facilities for expert mechanical instruction, inspection and repairs and the distribution of replacement parts. Good service requires the maintenance of adequately-equipped and competently-manned service stations, stocked with adequate supplies of parts located at points convenient to the bus operation. It is needless to add that such stations operate more efficiently when they are a part of the manufacturer's organization, in the form of direct factory branches, than when operated as more or less independent dealerships; though of course in smaller centers, factory branches are hardly to be expected.

Each prospective seller of equipment should be analyzed by the purchaser, having first made a selection of manufacturers building the particular class of equipment desired. The identity of the manufacturers to be thus analyzed, of course, will depend upon the class of equipment desired, so that certain companies well qualified as responsible, reputable and competent vendors will automatically be eliminated from consideration because they do not manufacture the equipment desired. In any such analysis, however, it will be found that no two concerns measure up identically, though there may be several who are regarded as suitable.

From this point the purchaser may proceed to a detailed consideration of the design and quality of the product of each and a final comparison of the values thus established with the quotations of purchase prices. The mechanical requirements of a motor bus depend upon the conditions under which it is to be used and contrary to the belief of many, their consideration does not involve abstruse technical theory; but rather the application of plain common sense.

Essentially, a motor bus comprises three primary units: The chassis, the engine and the body. Of these three it is difficult to ascribe to any one the preponderance of importance. A good engine in a good chassis, combined with a poor body can never be satisfactory either as an attractor of revenue-producing traffic or as an economical operating unit. A poor engine in an otherwise excellent job will certainly be a continual disappointment from every standpoint. Certainly a faulty chassis, regardless of how good an engine it may have or how well the body may be built is foredoomed to failure.

Manufactured or Assembled?

One of the first decisions which the purchaser must make is whether or not he will consider what is known as an assembled or "specialized" vehicle; by which is meant a vehicle composed of various elements each of which has been designed and manufactured by a separate and independent organization as distinguished from one whose entire conception and execution has been carried forward by a single organization working to one harmonious plan and to a definite end. On first thought it would readily appear that the latter class would hardly escape the preference; but the purchaser will find on investigation that persuasive arguments of several kinds will be advanced in favor of the assembled product. To cope with these arguments it is therefore well that the purchaser have a foreknowledge of them that he may not be taken unawares.

The so-called "specialized" units which are commonly incorporated into these assembled products are engines, clutches, transmission gearsets, front and rear axles, steering gears, frames, radiators and bodies. Such elements as magnetos, electrical systems, carburetors, driveshafts, springs and wheels are almost never produced by the chassis builder and only a few bus building companies produce bodies. This fact is often used to confuse the purchaser by asserting that all buses are assembled, differing only in the extent to which the product is manufactured or assembled. The fallacy is readily detected however, when consideration is given to the importance of the various elements involved.

The manufacturers of springs, driveshafts and wheels produce these parts to the exclusive specifications of the vehicle manufacturer, the simplicity of their structure and the highly specialized nature of their production making it unnecessary and uneconomic for the chassis builders to attempt to manufacture them. Carburetors and electrical accessories are even more highly specialized in their nature, as are batteries and tires and so are almost never successfully produced in vehicle factories anywhere in the world. Furthermore these parts are so specialized in their functions in the chassis that there is little to warrant individual differences on different makes of chassis.

Engines, clutches, transmissions, axles and steering gears, however, are so intimately associated with the basic fabric of the vehicle structure that to produce the proper balance of the whole, they must be designed and manufactured individually for the chassis in which they are to operate.

Resorting to a crude analogy, the parts in the first group may be likened to the buttons on a suit of clothes; those in the second to the coat, vest and trousers. The tailor producing a suit of clothes can hardly be expected to manufacture his own buttons, any more than he is expected to spin his own yarn or weave his own cloth; but satisfactory suits can hardly be produced by assembling a coat turned out in one shop, trousers from another and a vest from a third!

Drawbacks of Assembled Unit

In the specialized manufacture of parts such as engines, axles and transmissions, the producers must design their products to suit a large number of assemblers, each building a different design of vehicle. In order to compete in price with that for which the chassis builder could build these parts himself, the specialized maker must produce them in quantities. He is thus limited in the number of different types which he may produce with profit and also he is restricted by price in the quality which he may incorporate in the product. It is for this reason that the highest-grade passenger cars, motor trucks, motorcycles and farm tractors have always been those manufactured under one roof, as it were. Even the economy which is often claimed for the assembled vehicle by reason of the specializing of the builders of the components is open to question, for just as the builders who seek the highest quality products resort to exclusive manufacture, so do those at the other extreme, those building in great quantity to minimum price.

Quality is incompatible with the production of specialized parts, since quality in its essence consists of fitness for the purpose. This in turn involves two things, namely design and manufacture. For an article to be most perfectly adapted to its specific purpose, it must necessarily be designed and built specifically for that purpose. An engine must be designed to produce its maximum torque at the speed at which this maximum torque will be required which in turn depends upon the gear-ratios, wheel sizes and weight of the vehicle and its load. A transmission must be designed to afford the correct range of gear-ratios to fit the torque developed by the engine at various speeds and the rear axle ratio, wheel diameter and chassis weight. A rear axle must be designed to support the weight to be imposed upon it; to transmit the torque imparted to it by the driveshaft, at the speeds at which it is developed, and to receive its drive at crankshaft level; to afford the desired gear-ratio; and must incorporate brake equipment calculated to harmonize with the speeds, weights, and wheel diameters to be used. So throughout the design, for quality, design must be specifically laid down so that each unit is in harmony with every other. This is obviously impossible where specialized units, produced for general sale, each by a separate and independent organization, and to the number of fourteen in many cases, are assembled together.

From the standpoint of quality of material, processes of manufacture and workmanship, also, quality is incongruous with assembled production, for by catering to a general market, the producer of parts must cater to a mediocre market, being at once cut off from an outlet for his wares among the high-grade producers. He must offer his goods at a price lower than that at which the bus builder can produce them himself, else the bus builder will not sacrifice the greater adaptability and harmony which he might achieve by manufacturing his own components. Since better material, more thorough heat-treatment, more accurate machining and more searching inspection all increase production cost, they are inevitably effective barriers to low-price production.

The Ultra School in Bus Building

But there are other temptations which beset the assembler besides his ability to secure cheap component parts, one of which is the facility which this procedure affords to frequent, radical and rapid changes in design. A switch from this engine or that steering gear to another radically different type may be made almost overnight, so that a sudden change in sales policy can be quickly conformed to by the factory. An unprofitable line may be metamorphosed on short notice into something entirely different and better calculated to suit the passing whim of a particular class of buyers.

Naturally this circumstance permits the assembler to conform to every fad of the moment. Inevitably in a certain number of cases these fads prove their merit and become approved construction. In such cases the assembler is the first in the field and sometimes pioneers a real improvement—at the expense of the most progressive bus operators, of course—by demonstrating the feasibility of the new departure.

The genuine manufacturer, who by reason of the necessity of concentrating his extensive resources upon a product having a specific purpose only, is naturally unable to trim his sails in this way to every passing vagary of the wind. Accordingly he is obliged to withhold production on radical developments in design until they have been proven thoroughly. This process of proof goes on in the field, in the ranks of the enthusiasts and in his own laboratories and experimental department.

The superior reliability and economy and the greater longevity of the high-class product naturally enables the manufacturer to soon gain whatever ground he may have lost and amply repays the patience of the purchaser who adheres to quality in the face of the assembler's temptations, while the assembler blithely shifts his attack to a new direction.

As an example of this, the bus market has recently witnessed the pioneering of the low-deck bus by a few companies which formerly produced assembled trucks. Following shortly after this was an avalanche of low buses. The last to join the movement were a few of the solider and more substantial manufacturers. These last refused to place low buses on the market until months after the popular clamor for a low floor had virtually destroyed the market for high buses, although experiments with low-swung buses had been in process since long before the fad became a factor in the market.

Almost exactly parallel to this has been the development of the DeLuxe or Sedan type of body, the parlor car chair and other now established features of the modern bus. Meanwhile fads almost without number have arisen only to run a brief career and then die out. Failures of this sort are soon forgotten by all but those confiding purchasers who pinned their faith to untried and unproven experiments, thus paying for engineering experiment and development which should have been done at the manufacturer's expense before marketing the product. At the present time the drama is being re-enacted with the six-wheeled chassis, the air brake and the six-cylinder engine in the stellar roles. Only time can tell whether these will become classics or follies of the day.

In all mechanical development, a successful product is usually achieved only after many unsuccessful attempts to perfect many different ideas. The reason, therefore, why the assembler is usually the pioneer in new movements of the kinds described, is that he lacks the facilities and resources for the necessarily extended experiment and is obliged perforce to finance his development by the sale of his experimental models to his customers for them to try out; whereas the large manufacturer is able to finance and conduct these experiments himself. The final result is that the assembler rarely perfects his ideas to practicability, while the responsible manufacturer withholds his improved products until they have proven their value. The purchaser of the premature assembled experiment pays for the assembler's experience at the cost of disappointment to himself; while his more conservative neighbor, who waits perhaps six months or a year longer before buying the new style product, as perfected by the responsible producer is assured of a full dollar of value for every dollar invested and is soon repaid by consistent economical service for any sacrifice which his waiting may have entailed.

Servicing Assembled Buses

The greatest drawback to assembled construction, next to its inherent shortcomings in the way of quality, is its effect upon service. The outright manufacturer, since he designs all of the important parts of the bus in his own engineering department is able to preserve a high degree of standardization throughout the vehicle, which the assembler getting parts from a dozen or so independent factories cannot. By engineering the design of each part for the work which it is to do he is able to so balance and harmonize the design that glaring weaknesses are eliminated and to avoid the frequent changes in complete units with the consequent and serious complication of the repair parts problem. By producing his own parts he can control their supply and avoid the non-interchangeable changes which are constantly being made by parts makers to accommodate the demands of scores of chassis builders all employing the same units but in as many different kinds of products. Finally, by making and distributing the parts himself he can protect his customers against exorbitant prices for replacement parts which the assembler is wholly powerless to do.

Bus buyers who, because of these conditions, wisely resolve not to wild-cat with the assembler will find that in the motor bus field, more than in any other automotive field, the outright manufacturer is in the minority. Notwithstanding this, however, he will find a sufficient representation among these latter to supply any legitimate demand, so that in his search for quality he will not be confronted with a bewildering array of competitors from which to choose.

In thus narrowing the selection to a consideration of a few makes of manufactured buses of the types required, there remains for the purchaser to compare the general design of the vehicles, the details of their construction and the standards of quality incorporated in each. Keeping in mind that quality consists of the fitness of a thing for the purpose for which it is intended, it will at once appear that he must weigh each comparison on a basis of how completely each conforms with practical requirements.

Requirements for city work will naturally differ somewhat from those for suburban or inter-city work, while the requirements for hotel buses, sight-seeing, big city double-deckers, school buses, funeral cars and so on will each have individual aspects. Aside from these special peculiarities, however, we may consider here some of the fundamentals applying more or less to all types. By far the majority of bus applications at the present stage of development call for types that may be classed as twenty-five-passenger single-deck buses, either of the City or Sedan type.

Requirements of City Bus

In this class of equipment the general requirements are ample speed within safe limits, together with satisfactory hill-climbing ability, quietness, low suspension, ease of riding, maneuverability, stability in rounding corners, attractive appearance, convenient and comfortable accommodations, ease and handiness of control, and economical operation. Each of these general requirements involves other minor ones and all are interdependent.

Performance

Performance, by which is meant speed, acceleration and hill-climbing ability is the result of the relation between the horsepower developed by the engine, the gear-ratios in the transmission system, the wheel diameters, the weight of the vehicle and the mechanical efficiency of its various parts. Vast differences will be found in the performance ability of various buses. As with everything else, however, the best choice is not a maximum nor a minimum. The relation of performance to other desirable and equally important features may be visualized as a triangle. One of the sides of the triangle is Performance, another is Ruggedness and the third is Economy. The ideal bus may be conceived as an equilateral triangle, in which the performance, the ruggedness and the economy are all in perfect balance. If the Performance side of the triangle is increased, one or both of the other sides must either be increased in proportion or allowed to become shorter.

Performance within reasonable limits is certainly desirable and it is the duty of the engineer designing a bus to provide as good performance in every respect as he can without undue sacrifice of either Ruggedness or Economy. Speed, for example, is dependent upon the ratio between engine horsepower and vehicle weight, assuming the gear-ratios to be appropriate to the wheel diameters. It may be boosted to extremes either by installing an engine entirely out of proportion with the rest of the vehicle or by paring down the weight. If the former is done, the engine will probably take up more room and, as the wheelbase is limited by what may conveniently be maneuvered in city streets, this will restrict body space. Such a large engine will furthermore weigh a great deal more than a moderate-sized one and will subject all driving parts to much higher torque and the rest of the chassis to greater stresses reacting from the drive. Accordingly the entire bus must be made much heavier than the load alone would justify and as operating cost is roughly proportional to weight, this will greatly reduce Economy. If, on the other hand, the strength of all chassis parts, particularly the driving system is not increased in proportion as the larger power-plant imposes more severe loads upon them; then ruggedness will be sacrificed and with it economy as well. Besides all of this, of course the steering, braking and riding problems will also be greatly aggravated, which will react unfavorably on safety. What is true of speed is also true of acceleration and hill-climbing ability.

Ruggedness

Ruggedness requires strength, adequate bearing surfaces and endurance. These are matters of sound design, high-grade materials and precise workmanship. But even here it is possible to go too far, though the purchaser hardly need fear it, for if endurance, long life, low maintenance and robustness alone are to be stressed in the design, this will certainly entail sacrifice of the power-to-weight ratio which will decrease performance and it will lead to excessive weight which will sacrifice economy.

Economy

From the above the relation of performance and ruggedness to economy will be readily apparent. Of course from an economic standpoint, economy in its broader sense involves more than mere operating expense, including also a consideration of earnings and ultimate and all-in costs. In its narrower sense, and unfortunately the sense in which it is generally regarded by the bus operator, it is confined to a consideration of running charges only, such as fuel, lubrication, running supplies, tires and platform labor. In this sense the maximum economy must certainly involve sacrifice of both performance and ruggedness.

Special Requirements

However nicely balanced these main characteristics might be, however, no bus design would be suitable that did not measure up to some of the more special requirements of bus operation, as distinguished from those of other motor vehicles. Low suspension is one of these. Here, as in everything else, the best results are not achieved by going to extremes. From long experience a floor height in the bus of 24 or 25 inches, under load, has been found low enough for all practical requirements of a single-deck bus. DeLuxe buses are quite satisfactory with slightly higher floors, even up to 30 inches and more. It is important that the purchaser distinguish at this point between frame height and floor height. From the practical standpoint, the height of the frame is of little importance so long as the floor is kept low. In some buses a very low frame is rendered wholly ineffective by the body floor construction which raises the floor a considerable distance above it.

It is not sufficient to dismiss this subject with a determination of the height of the floor, however, for the manner in which the height is secured is vital. There are various means employed in modern buses to secure a low floor. Among the commoner methods is the use of a drop frame with an undershot worm-drive axle. Deferring for the moment any consideration of the desirability of this form of drive gear, the purchaser should certainly hesitate to purchase a bus with this arrangement of drive because of the low road clearance offered beneath the rear axle and along the whole centerline of the chassis, particularly where snow, mud or sand is to be encountered or where arched bridges or single-track grade crossings are to be crossed. The drop frame is also of doubtful value.

Frame Construction

In the drop frame, the rear end and sometimes the front end is formed with a double bend or crook, known variously as a drop, kick-up or gooseneck. This naturally decreases the strength of the frame at the point of the bend or else requires that it be made considerably heavier for the same strength. Some makers have even gone so far as to patch in the frame side-members steel castings over the rear axle. The only reason for this must be for cheapness, for metallurgists know how unreliable steel castings are and how unsafe they are at points of great and alternating stress, such as at this point of the frame. They also are much heavier for their strength than pressed alloy steel and finally require riveted or welded joints at points of great stress. Other types of buses use cranked rear axles, in which the central portion is somewhat below the centerline of the hubs, final drive being by internal gears in the brake-drums.

It is needless to say that the achievement of a low floor without resorting to these axle constructions is eminently desirable, particularly if the main parts of the axle are interchangeable with corresponding parts on nationally-distributed motor trucks and therefore obtainable anywhere. In addition the retention of a flat frame is particularly to be sought for, since not only is a straight frame lighter for the same strength, but, due to the absence of bends, is longer lived. This arises from the fact that the presence of bends in the frame leads to localization of stress at the bends, leading to rapid fatigue. Besides these advantages, the straight frame can be made more rigid than the drop type and permits easier and more secure body mounting.

While on the subject of frame construction, with the long wheelbases necessarily employed on buses and with the necessity of rigid body construction, it is essential that the frame combine great strength with rigidity while at the same time avoiding excessive weight. This is best done by the use of a frame of alloy steel, such as chrome nickel steel, heat-treated and pressed into channel form, tapering from a generous depth at the middle to less depth at the ends and stiffened with torsion cross-members of steel tubing, securely assembled to the side-members. The strength of a frame, of course, cannot be judged by the depth of the channel alone, as a very deep frame, if made of thin steel or of ordinary carbon stock will be much weaker than one not excessively deep, but of $5/16$-inch heat-treated chrome nickel steel.

Riding Qualities

From the bus operator's standpoint there could hardly be a more vital attribute to a bus than ease of riding. The motor bus has taxed the ingenuity of engineers to equal or excel the riding ease of a high-grade trolley car, operating on smooth steel rails or a luxurious private motor car while, for economic reasons, keeping the weight per passenger much less than in either. Ease of riding has been found vital not only from a revenue standpoint, as an attractor of traffic, but also from the standpoint of maintenance. There can be no hard and fast rules by which riding ease may be judged. The length, quality and shape of springs, the proportion of sprung and unsprung weight to the total weight, the wheelbase, tire equipment, general balance of the chassis and the kind of seats all contribute their share. In this respect all bus builders are on a common footing, as are those of taxicabs and touring cars. The only real basis upon which ease of riding can be determined is careful observation and test of actual buses on streets of various kinds. In making a riding ease test it is important that the purchaser give due consideration to how much of the riding ease is the result of the chassis suspension and how much depends upon the seat cushions, bearing in mind that the former is the most important, since it affects both standees and seated passengers and the chassis as well, and bearing in mind that a deficiency in seat cushions is easily overcome while a chassis which is fundamentally hard riding can rarely be made to ride easily under all conditions by any combination of shock absorbers, air springs, snubbers or other like contrivances.

Unquestionably the most important contribution to ease of riding in the history of motor vehicle construction is the rubber Shock Insulator. This device, used on several different makes of vehicles, including touring cars, taxicabs, trucks and buses, consists of yielding rubber cushions, inclosed under pressure within steel boxes, riveted to the frame in the place of spring shackles, in which the ends of all springs are embedded. Their effect is to completely insulate the springs from any metallic contact with the frame. They absorb in themselves the minute and very rapid vibrations of the springs, damp out a certain amount of excessive oscillation and permit the springs freedom to twist in the rubber blocks in response to sidewise see-sawing of the axles. They also eliminate all friction, the action of the rubber being that of kneading entirely, and banish at once all spring shackle lubrication, wear, rattle and replacement. They add to tire mileage, spring life and chassis longevity. They protect the chassis from destructive vibration from the road and the passengers from the unpleasant sensations arising therefrom. Their life is measured in years, regardless of mileage, their reliability is absolute and they are replaced only at rare intervals and at trifling cost.

Other requirements, such as quietness, maneuverability, stability in rounding corners, attractive appearance, passenger accommodations and convenience of controls each has an important bearing upon the success of the installation and so warrants the careful scrutiny of the purchaser. The final analysis before purchase must bear upon the mechanical construction of the bus in detail.

The Engine

Starting with the engine, the buyer may be called upon to decide whether four or six cylinders shall be used. The wisest course to pursue is to dismiss this subject, since it is results which are required. The question is not how many cylinders, or how many valves or how much horsepower the engine develops. The question is how well fitted the engine may be to its purpose. The engine should be possessed of just the right power, which is best determined by its performance; it should operate economically, which can be judged not so much from its gasoline and oil consumption as from the general ruggedness of its construction; it should be reasonably quiet and quite free from excessive vibration. All of these requirements can be met with an engine of either four or six cylinders, depending upon the characteristics of the rest of the bus.

Much closer to the point would be a consideration of details of the engine's make-up. As the crankshaft is the backbone of the engine, the hardest-working part and the seat of a large proportion of the difficulties often encountered in some engines, this may as well be given first consideration. The crankshaft must be stiff and rigid if it is to operate without vibration, to maintain its alignment in its bearings and to endure operation at high speed for long periods, as in bus operation. Rigidity depends upon one thing alone, namely cross section. The larger the diameter of a bar of steel, the stiffer it is, regardless of material or treatment. The use of four, five or seven bearings for a small-diameter crankshaft will only reduce deflection or whip slightly and at the expense of the bearings and will not reduce torsional deflection or twisting. As a matter of fact the increased number of bends in the shaft necessitated by a large number of bearings will only make it weaker in every way. Thus it is best to have a crankshaft with a large cross-section; certainly not less than 3 inches at the main bearings. To avoid too many bends in the shaft, it should not have five bearings. In the four-bearing and two-bearing arrangements there is no central bearing and so the point of the shaft which most requires support is deprived of it. For the four-cylinder engine, therefore, the three-bearing arrangement is best, though in large sixes four bearings are usually necessary to avoid too great an unsupported length between bearings.

Besides stiffness, a crankshaft also requires ample bearing area. The purchaser may well look to this point, for the life of the bearings is largely dependent upon their area. One other factor enters into the durability of bearings and the shaft itself, as well as the freedom with which it turns. This is the hardness of the shaft journals. If these are left soft they will soon lose their polish, causing more rapid wear of the bearings and themselves suffering from rapid wear. This is more important in motor buses than almost any other class of motor vehicle because of the greater mileage traversed by buses and the higher speeds of bus engines. If the shaft is hardened to any extent by heat-treatment it will become more or less brittle and therefore in danger of breaking or crystallizing from fatigue. Accordingly the best practice is to case-harden the shaft, imparting the hardness of plate glass to the wearing surfaces of the journal, but leaving the inner section of the shaft soft and consequently tough and enduring. Incidentally this case-hardening process can only be performed on a shaft of generous section as thinner shafts distort unduly under the heating and cooling operations in the process.

Vibration and Balance

Vibration in any engine is the result of unbalance. This lack of balance may exist in the crankshaft, the connecting rods, pistons or even in the volumes of the combustion chambers. At the speeds at which bus engines must operate such lack of balance sets up unbearable and often destructive vibration which must be overcome by careful balance of both rotating and reciprocating parts. The balancing of combustion chambers, pistons and connecting rods is a matter of careful factory process. That of the shaft requires this and more. By the use of precision balancing machines, the best manufacturers put their shafts in both static and running balance. For dynamic balance it is necessary to provide the shaft with counterweights. These counter-weights, if properly applied and balanced produce engines which run with remarkable smoothness even at high speeds; but for safety they must be very securely fastened to the crankshaft. The common method is to fasten them by bolts or studs running radially of the crankshaft, through the cheeks of the shaft. This places the full centrifugal force, tending to tear the weights off the shaft, on the threads of the nuts. A better system which has recently appeared consists of sliding the counterweights onto dovetailed seats, endwise of the shaft, with bolts running crosswise of the shaft to hold them in place. The bolts are thus under no centrifugal stress whatever, these stresses being taken by solid forged lugs on the shaft and counterweights.

Engine Support

Another feature of importance is the suspension of the engine in the chassis. Here again we find a conventional practice which has been greatly improved upon in a few engines. The usual suspension of the engine is by arms cast on the iron or aluminum crankcase, these arms being bolted or trunnioned to the frame or subframe of the chassis. Some of the engines so suspended have three points of support, some four and others six. By all means the three-point support is to be preferred. To appreciate the strength of this it is only necessary to remember that no structure can be made perfectly rigid and that consequently in traversing uneven surfaces, the bus frame is bound to do a certain amount of twisting. If four or more points of support are used for the engine, this twisting of the frame will subject the power plant to severe twisting strains which will either injure the crankcase, even breaking off the support arms, loosen the supports in the frame or throw the main bearings out of line. The latter is by far the most likely result, to the obvious prejudice of the well-being of the entire engine.

By far the safest and most satisfactory system of engine suspension is that using separate steel beams for the support of the engine, affording three-point suspension. In such construction, the rear end of the engine is hung from a drop-forged I-beam by through-bolts extending entirely through the beam and crankcase and holding the rear main bearing cap. This beam is mounted in trunnions on the main frame. It not only gives a firm, yet flexible support to the rear of the engine, but it relieves the aluminum crankcase of all supporting duty and insures correct alignment with the rear main bearing at all times. At the front end, the timing gearcase is usually provided with a trunnion which rests at the center of a rigid cast steel beam forming a cross-member of the frame.

Necessarily in this chapter many details which are well worthy of the bus purchaser's attention must be omitted; but before leaving the power plant it is well to consider a few points in general engine construction which should receive particular scrutiny. The timing gears of most engines, particularly the cheaper ones, are made of cast iron with helical teeth. This combination provides quietness while the engine is new, due both to the angularity of the teeth and the soft nature of the iron. Such gears are very short lived, however, exceptionally so under the heavy duty and high mileage typical of bus operation, so that they become a source of continual expense and annoyance as well as disagreeable noise. Substitutes for this arrangement in the form of fabric or fiber gears have proven no more satisfactory, while silent chain drives have been too short-lived to even merit the consideration of any but a very few builders and these, concerns which do not build the engines used in their products. Buses are obtainable having gears of steel, some of them drop-forged, with helical teeth, and case-hardened and finished by a generating grinding process which provides them with teeth so perfect that while practically everlasting, they are quiet throughout their life.

Handling Present Fuels

Present grades of gasoline are much lower in volatility than those obtainable in former years, due to the impossibility of supplying the demand for high end-point fuels in the enormously increasing modern volume. Accordingly it is necessary to equip buses with effective means for pre-heating the carburetor air when the engine is cool, to insure vaporization; but with a control by which cold air may be admitted after it has warmed up. This latter is necessary because the heating of the air expands it and so robs the engine of the quantity of oxygen it might receive were the incoming air cooler and therefore more condensed. It is also desirable that a means of controlling the temperature of the water be provided. Some buses have thermostatic by-passes in the system by which the radiator is cut out when the water is cool, thus speeding up the warming of the engine. These devices, however, present a real danger in freezing weather, unless the driver is extraordinarily careful about blanketing and unblanketing his radiator, since they serve to prevent any circulation through the radiator so that it may freeze up while the engine is warming. A better scheme is the use of radiator shutters, controlled from the dash and checked by a radiator thermometer.

In many districts in which buses operate the roads become dusty. This dust, if not prevented from so doing, will be drawn in with the carburetor air and will do a great deal of damage inside the engine, the least of which is the rapid formation of carbon in the cylinders and on the valve seats. The bus buyer should therefore demand an air filter of a type which experience has shown is properly adapted to the engine on which it is installed.

The Transmission

Passing next to the transmission, the bus operator should consider well whether the conditions under which his buses will operate require direct drive in third speed or in fourth. As a general rule, the former is adapted to level country and the latter to hilly conditions. Where a bus operates almost entirely on congested city streets where there is little opportunity for speed and where acceleration is the main requirement, the direct-geared type, viz., that having direct drive in high, may be preferable. Again, in gently rolling country and where there are only a few grades on an otherwise level route, the overgeared type, having direct in third often proves best. As to the construction of the transmission, the purchaser should satisfy himself that the gears and bearings are of ample size. For the usual size of twenty-five passenger bus, the gears should have a face of 1 inch with adequate-sized shafts throughout. The square type of sliding gear shaft has not proven satisfactory in passenger cars, trucks or buses and so the splined variety should be given the preference.

Due to the weight of buses, together with the necessity for speed, it is necessary to operate a much greater proportion of the time in other than direct drive in buses than in other types of motor vehicles. This fact requires that the transmission be silent in both of the two upper gears, at least. Such silence with the durability which is indispensable can only be secured by case-hardening the gears and finishing the teeth by a generating grind. Transmissions made in this way are now obtainable.

Driveshafts of buses are necessarily of great length and so must be split into more than one section. Sometimes this is accomplished with but three universal joints, one of which is at the front end of the forward shaft and the other two on each end of the rear shaft, leaving the rear end of the front shaft without a universal. This construction can only be defended as cheap, as the single bearing which is used to support the rear end of this shaft is certain to be short-lived. A better practice is to use a universal at each end of each shaft, preferably divided by a shaft brake, firmly anchored and running between two bearings. The fabric disk joint has been given ample opportunity to prove any merit it may possess. For the present, however, it is best avoided as up to now these have proven of short life and their inability to keep the shaft centered leads to severe vibration destructive alike to the transmission and rear axle bearings.

The Rear Axle

The rear axle is an exceedingly vital element in the make-up of a motor bus, since it must not only carry the greater part of the load, but must both drive and brake the bus. From the standpoint of its first mission, that of carrying the load, it must of course be staunch and strong enough to carry any load imposed upon the bus in addition to its own load of driving gears and shafts and stiff enough to resist forces tending to deflect it, since the latter would result in misalignment of shafts, gears and bearings. Axles to fulfill these requirements can be made of steel castings or drop-forged steel. The latter can be made stronger, lighter and much longer-lived and so is used on the best makes of buses.

Shaft-driven rear axles are made for buses in two general types, floating and semi-floating. In the floating type, the wheels run upon two bearings each, just as they do on the front axle or would on a dead rear axle. They are driven by axle shafts splined or clutched more or less flexibly to their hubs, these axle shafts having no duty other than transmission of the drive. In the semi-floating type the axle shafts are rigidly secured to the wheels which depend upon them for their sole support. The shafts are thus called upon to sustain all of the weight in addition to driving the wheels. The outer bearing of the axle is naturally located within the axle tube, with the wheel overhanging outside. A broken axle shaft on this type of axle—which is by no means an uncommon experience—immediately cripples the bus so that it cannot even be towed, as well as leading to considerable risk of disaster should it occur while the bus is running at speed. For the sake of safety, therefore, the semi-floating axle should be avoided. From the service standpoint it is equally disadvantageous, as no work on the axle shaft, differential or driving gears can be done without jacking up the axle and either pulling the wheel from its tapered key fitting or else releasing the outer axle bearing from its mounting and drawing off the wheel.

Final Drive

There are four forms of final drive gearing in present-day motor buses, namely, worm, internal-gear, double-reduction and bevel. The latter can be immediately dismissed as applicable only to the smaller and lighter types of buses, for which it is without peer, but wholly unadapted to larger buses, say from 16 passengers upward, due to the limitations in size and gear-ratio inherent with this type of gear.

Worm drive is offered by a greater number of bus builders than any other; but among high-grade buses it is in the minority. Many years of experience in this country and abroad has shown that while quiet and clean and reasonably efficient under light-duty conditions, it is inefficient and unreliable when called upon for heavy duty. It is on account of its inefficiency, particularly in coasting and acceleration that after a thorough trial over many years on both sides of the ocean it has been abandoned by nearly every passenger car builder. It is already on the wane among truck and tractor builders. Its use, however, is not sufficient reason for condemning a bus, for there are many thousands of buses in operation today with worm drives which though they might be better with a different drive, do provide transportation. At least it is much to be preferred to the internal-gear drive.

The internal-gear drive is used on buses mainly as a means of cranking the rear axle to permit extremely low floors for double-deckers. In this application its defects are tolerated for the sake of its advantages, which may be justified in the absence of any other recourse. Happily, however, in the single-deck field, we are not confronted with any such hard decisions. This form of drive would not be thus so briefly dismissed were it more of a factor in the bus field.

The double-reduction drive embodies all of the advantages of the worm drive, without its drawbacks and without entailing any of the faults of the internal gear. Like the worm drive it is silent and clean, the entire reduction being centralized in one compact gear group at the center of the rear axle. The location of the pinion shaft can be laid out at any height desired so as to secure straight-line drive, whereas the worm shaft must be excessively high, as in the overshot worm, precluding its use on modern low-deck buses, or outrageously low, restricting ground clearance, as with the undershot type. All of the gears are of the toothed, rolling type, bevel or spur, whose efficiency is so well known and established. Changes of gear-ratio are easily and quickly made in the best double-reduction axles and road clearance is generous.

The Brakes

No judgment of a bus is complete without very careful consideration of the braking system. Out of the maze of different types, locations and constructions of brakes, brakes on the rear wheels, brakes on the front wheels, brakes on the axle, on the transmission and on the driveshaft; brakes operated by the hand, by the foot, by air, by oil and by vacuum, the purchaser must pick a construction which will best perform the tremendous task of stopping a heavy motor bus quickly, smoothly, safely and repeatedly. To avoid utter confusion he has merely to go back to fundamentals. The function of a brake is to stop the bus. To do this it must absorb a great deal of kinetic energy. This all brakes do by converting this energy into heat, through the medium of friction. The friction is produced by pressing a stationary shoe against a moving drum. In so doing the momentum tending to keep the drum turning is converted into heat and thus dissipated, bringing the vehicle to rest. A brake must therefore have sufficient power to produce the heat by friction, sufficient heat-radiating ability to carry it away quickly and radiate it to the air, sufficient durability to repeat the process almost indefinitely and sufficient rigidity to act smoothly and evenly, without chattering or seizing.

These requirements call for the maximum wheel drum diameters that can be fitted within the pneumatic tired rims with the maximum practicable width of drums. They demand that the outside of the steel drum shall be unobstructed so that the air may reach it to carry away the heat. They demand that the drum shall be stiff and heavy enough to resist the tendency of the shoes to distort them and that the shoes themselves be staunch. But there is more.

Independent Brakes Desirable

Since a single set of brakes will certainly become overheated very quickly if applied continuously, as in descending a grade, an alternate set must be supplied to bring into use before burning results. This alternate set to be effective must act upon a separate drum or drums which have had an opportunity to cool, for to apply a secondary brake to the already overheated drums upon which the primary set have been applied would increase the heat. It is this which has given rise to the use of the shaft brake. It should be insisted upon by the purchaser because in no other practicable method can this important object be attained.

As the shaft brake can hardly be expected to have as much braking surface as the rear wheel brakes and as the foot brakes are the ones most frequently used, it follows that the rear wheel brakes should be foot-operated and the shaft brakes actuated by the hand lever. The requirements of a good shaft brake are simple: Its drum must be mounted between bearings and protected against cramping or being cramped by the driveshafts by a universal on either side. The bearings for the brake shaft and the anchorages for the shoes must be mutually supported by an exceedingly rigid base eliminating all possibility of springing of the shoes in relation to the drum, which would result in destructive and exasperating chatter. The shoes themselves should be exceedingly rigid, preferably drop-forgings.

Brake Adjustment

Half the secret of good brakes is proper and frequent adjustment. Unless the adjustment of the brakes can be made without difficulty or loss of time, nine drivers or mechanics out of ten can be depended upon to neglect them until too late. Consequently the adjustment should be of such nature that it may be made by a mere twist of the wrist, by hand and without tools, as is the case with the best makes. The rear wheel brakes should naturally be equalized by incorporating a cross-tree in the linkage so that the tension on the two pull-rods is always equal.

Front wheel brakes are still in the future, so far as safe bus practice is concerned. Until more has been learned concerning their application to heavy buses it is the safest course to wait. Pneumatic, vacuum and hydraulic braking schemes merely substitute a source of mechanical power for the muscular energy of the driver. The brakes themselves, used with these systems are friction brakes, usually the same brakes that are ordinarily hand applied. Here again is an opportunity for the venturesome operator to gamble with machinery to his possible profit or loss.

Safe Steering

In the opinion of some, quite as important as brakes, from the safety standpoint, is the steering of the bus. This involves the front axle, the steering gear and their inter-connections. There is little to be said of the front axle beyond a general caution concerning the vital necessity for the highest quality and most liberal factors of safety in its every part. For this reason the so-called Reversed Elliot type of steering knuckle is much to be preferred. This is the type, now so rapidly reaching predominance in the passenger car field, in which the yoke of the knuckle, usually shrouded, is on the spindle end instead of a part of the axle center. One advantage lies in the fact that the yoke is thus made of the high-grade alloy steel of which the spindles of all quality vehicles are made instead of the somewhat milder stock of the axle center. The design also eliminates all yoke overhang and permits much longer knuckle pin bushings to be used.

Buses will be found with the tie-rod in front of the axle and others with it behind the axle. The former location places it under normal tension instead of compression, permits it to be made much straighter and renders its joints readily accessible for lubrication, with obvious advantage. Both the tie-rod and the drag-link by which the steering gear lever is connected with the steering knuckle should be of one-piece construction and fitted with large hardened and ground ball studs. Ball joints are greatly to be preferred to clevises because they are truly universal joints, cannot freeze or bind, as a bushed pin can, and are self-adjusting for wear so that if well made they never cause rattles or back-lash.

There are several good types of steering gear, but the best of these is the worm and complete gear, since this type outwears all others and if made in a high-class manner can be made to operate with greater ease and freedom from back-lash.

Consideration for the Driver

Finally, before concluding his comparison of the various chassis from which he must choose, the buyer should give careful consideration of the extent to which the driver's comfort, convenience and well-being have been fostered by the various builders. When the bus is purchased and turned over to the driver or drivers to take out to earn the maximum number of fares at the minimum cost of operation, a great responsibility has been entrusted to him, which he will carry to the benefit and profit of his employer or to his prejudice according to his human reactions to the environment in which he works. The driver is only a driver, it is true, but at the same time he is the bus operator's salesman, his collector and the custodian of a valuable piece of equipment. Anything which contributes to his comfort, convenience or freedom from fatigue therefore must redound to the benefit of his employer.

Accordingly a steering column which has a comfortable rake is much to be preferred to the more erect variety. The inclined column places the steering wheel in a much more comfortable and convenient position, renders steering easier and permits the driver to occupy a more restful posture. Pedals should be arranged so that the driver's legs are not cramped. There should be a comfortable space to the left of the clutch pedal for the driver's foot so that he will have no excuse for "riding the clutch." The hand brake and gearshift levers should be long and so positioned that the driver's hand falls naturally to them and with such movement that they are easily manipulated. Whether running adjustments and lubrication devolve upon the driver or a mechanic or inspector, it is important that the points to be lubricated be reduced to a practicable minimum and that all chassis lubrication be accomplished by the pressure gun system. Convenient means should be provided for checking the level of lubricant in the engine, transmission and rear axle. Each bus should have attached permanently to it a lubrication diagram, giving specific directions for lubrication and of such nature that it cannot easily be detached or defaced. Etched brass, zinc or aluminum plates are excellent for this purpose.

The Body

Body requirements differ radically, according to the class of service to which the bus is to be applied. However the details of arrangement and fittings may differ, though, there is but one class of body that will give lasting satisfaction to the bus operator—the highest quality obtainable. The bodies of motor buses are subjected to the hardest kind of service. They are exposed to the jolts, racking and vibration of great mileages, myriad starts and stops, every kind of weather, and the scuffs and kicks of millions of feet. At the same time they are one of the most important advertisements of the service and so must withstand all of this use without losing their trimness and smartness of appearance and without developing distracting squeaks or rattles. This has proven one of the hardest tests of the bus-body-building art. Relatively few of the many concerns which have undertaken bus body building have succeeded in producing bodies which are satisfactory in every particular.

In general, three classes of builders are engaged in bus body construction on any considerable scale, namely, coachbuilders, car builders and wagon builders. The first have confined their efforts chiefly to the production of DeLuxe types, though several wagon builders have also entered this field. The car builders have concentrated chiefly on the city types, similar more or less to street car bodies. The wagon builders, with a few notable exceptions have gone in chiefly for low-priced city bodies, catering to the assembled bus trade. These three types of builders have begun their development, each with an experience radically different from the other. The coachbuilders have been handicapped by relative inexperience with exceedingly large structures and their products heretofore have suffered from excessive weight and cost. The car builders, too, have inclined to overweight due to trolley car traditions, in which weight has been a minor factor. The wagon builders' early offerings were inclined to be flimsy affairs, noisy and crude. Each, however, as they gained experience, has profited by the example of the other and the findings from users, so that today their products have been greatly improved, so that there is a less wide divergence of practice. As a rule the products of coachbuilders are still distinguished by their greater grace of appearance; by the more skillful joinery and finer finish and by the little niceties of seat spacing and inclination, window hanging, and harmony with the chassis. The car builders' products as a rule follow street car traditions in both appearance and appointments, stressing robustness to withstand the roughest treatment; standardization of parts, such as interchangeable panels, posts and windows; and carrying out the styles prevalent in trolley car bodies. Great strides have been made by wagon builders in stiffening and silencing their bodies and in refining the outward appearance and inside fittings.

Body Construction

In settling upon body equipment, therefore, it is well for the purchaser to go much deeper than the paint in judging which of the many bodies that may be offered him, he will choose. He will find bodies made entirely of wood; some of wood and plywood; some with wood frames and metal paneling; some all of steel; some with wood frames and soft fabric panels. None of these various sorts of construction can be immediately dismissed from consideration. It is possible to build a satisfactory body of any of these combinations of materials. Each will have some advantage over all others and also some disadvantages. The important thing is how well the body builder has used the materials with which he works. The satisfaction obtained will depend upon a few principal factors, namely, the weight of the body; the quality of the joinery employed in its construction; the extent to which the arrangements, accommodations and fittings conform to the requirements of the operator's line; the appearance of the body and the smoothness and durability of the exterior paint or other finish.

The arrangement of the seats, doors, windows, compartments, roof, etc., will depend upon the requirements of the service in general, though different bodies will offer variations in detail well worth considering. In the selection of the body, therefore, this will be the starting point from which the inquiry will proceed to the details of construction, the kind and quality of materials used, the weight and the price. No compromise should be made with quality. The best suited materials throughout, the soundest design, the most skillful workmanship—these are indispensable. Light weight is highly desirable, since every 150 pounds of useless weight is the equivalent of one "dead-head" passenger; but weight is not worth saving at the expense of the solidity and endurance of the body or at the cost of rendering the body uncomfortable or unsightly. The price of the body is just as important as that of the chassis and should be judged by exactly the same standards. The question is not how much, but how good. Thrift consists in getting a good dollar's worth.

The City Type Body

The city type of bus, operating principally in built-up sections, where the rides are short and the stops frequent, requires a body of the pay-enter type, whose entrance door is wide; with a single step, close to the ground, and protected by a door which opens and closes quickly, easily and with reasonable silence. The seating must be such as will provide the maximum seating capacity compatible with the comfort and convenience of the passengers, the economic load which the chassis will carry and the requirements of the service, and space must be provided for standees. The latter requires ample headroom so that a tall man with a hat on can stand and walk erect within the body. In most districts an emergency door is required and the driver must be seated individually so that he cannot be interfered with or jostled by passengers.

Concerning ourselves first with the door, there are two types in general use on city type buses. The first and most popular is the two-leaf collapsing type, as ordinarily found on street cars. The other is the sliding type, as found on elevated and subway cars. The latter is very difficult to keep from rattling because there is no way of putting it under tension when open or closed. It also requires a double window just back of the door which restricts seating space and vision and makes it particularly difficult to keep the windows clean. Since it must slide back to open and forward to close, its inertia, which is considerable, acts against the driver at each movement. When opening the door for a stop, time saving demands that it be started open just an instant before the wheels come to rest. At this time the slowing of the bus imparts forward momentum to the door, making it very difficult to open. Again, when closing the door, on starting the bus, time-saving demands that this be done simultaneously as the bus starts to move. Here, the inertia of the door again resists the efforts of the driver. The result is that with this type of door the driver must either close his door before starting the bus and leave it closed until after it has come to a standstill, which involves a delay at each stop which, though small, mounts up at the end of the day; or else, which is more likely to be the case, he will not attempt closing the door until the initial period of acceleration is over and the bus has moved a couple of lengths, and will open it before applying his brake to stop.

The Best Door

The former practice, of course, is admirable from a safety standpoint, but there being every physical and traffic reason against it, it is unlikely to be followed.

The collapsing two-leaf door, if hung from the front edge of the door, on the other hand, is semi-automatic in action, since its inertia acts in the opposite direction. In coming to a stop the driver has merely to unlock the door by turning the operating crank past center and the door will remain closed until the last grab of the brakes on stopping, when its own inertia will cause it to open. In a stop of any duration, then, he may turn the crank over the other center, locking it open. When ready to start again, he has merely to pull the crank off this center to allow the door to close of its own inertia when he pulls away from a standstill, locking it closed after the bus has gained headway. If this type of door is hung from the rear side, however, this action will be reversed and it will be as bad or worse than the sliding type.

Besides these conventional types of doors there are others which possess more or less merit which warrant the buyer's scrutiny. It has been the custom in street car building to make the door of wood, while the car panels are of steel, the wood door being stained and varnished a cherry color. It has also been the custom to glaze the panels all of the way down, the lower glasses being of the wired variety to prevent their being kicked out. This was originally necessary for the convenience of the conductor at the rear of the car, where he could not see the waiting passengers as the car approached a stop, nor, because of the height of the car from the ground, could he see children or those of small stature through the upper panes. Before buses came into extensive use, street car builders were practically the only ones building bus bodies with the two-leaf collapsing door and it was natural that without much analysis, they should apply the same type of door, oblivious to the fact that the driver was afforded an excellent view of the passengers waiting at a stop through the front windshield. Furthermore, buses in those days were usually merely truck chassis with bus bodies and so were very high.

Today buses are much lower, so that the need for any glazing in the doors below the belt-line is removed. Furthermore, people are beginning to see that it is the high, narrow door, breaking through the continuity of the side of the bus from radiator to rear end which deprives them of the grace which they might otherwise have. This is the reason why the left side of the conventional city bus always looks so much better than the right side. All of this is not due to the glazing, either, for the practice of staining and varnishing the door while the body side is painted or varnished in color aids in making the door incongruous. Modern styles in city bodies, therefore, call for the glass in the door to match up with that in the windows, with solid panels below the belt-line and for the door to be finished to match the sides of the bus.

Closely associated with the door is the step. Modern low buses have a single step between the ground and the body floor. Full advantage should be taken of this fact to make the step of generous depth from outside to inside. It is also important that adequate grab-handles be provided both inside and outside to enable passengers to enter and leave safely. These should not be attached to the door, for fear that a passenger in clinging to such a one will pull the door closed thereby not only occasioning delay and confusion; but possibly causing him to lose his balance.

Seating Arrangements

There are three conventional seating arrangements in city buses, namely lengthwise seats, where all passengers face the aisle; cross seats, where all passengers face forward and the compromise arrangement in which some of the seats face sidewise and some face forward. In selecting which of these arrangements best suits requirements, only two points need be given consideration, namely, comfort to passengers and standing room, since the seating capacity can be made the same with any arrangement. The lengthwise seats afford the least comfort to seated passengers and the maximum standing room. The cross-seat arrangement affords the greatest comfort to seated passengers and the minimum standing room. The third arrangement, of course, is a compromise.

The longitudinal seat is decidedly in disfavor, since it offers accommodations inferior to those afforded by most trolley cars, very limited vision to any passenger and leads to crowding. There are cases, however, such as lines which serve factory workers, miners, steel workers and the like, over very short routes, where it is justifiable. The cross seat is much more in keeping with the bus ideal of maximum service to the public, which accounts for its popularity not only in modern buses but in street cars as well. For residential routes, where distances are not markedly short or the stops very frequent, therefore, this seating is much to be preferred. There are conditions, though, in which slightly more standing room is required for the rush periods of the day, in which one of the various compromise arrangements may be preferable. Probably the best of the compromise schemes has a number of cross seats at the front of the bus and a rotunda in the rear, formed by longitudinal seats over the wheel houses and a wide seat across the back. This affords considerable standing room at the rear of the bus, where the weight is best carried and away from the door, with satisfactory comfort for more than half the seated passengers. In addition, this type of arrangement very nicely takes care of the question of wheel housing. The trend toward the lower bus has necessitated allowance being made in the floor for wheel clearance to even a greater extent than previously, and has resulted, where cross seats are used, in the seat over the wheel housing, and sometimes the one directly back of it being made very uncomfortable. By the use of side seats, however, the wheel housing is completely under the seat and causes no discomfiture. The reverse of this arrangement, in which the cross seats are all at the rear half of the body, with side seats at the front is favored where there is both long, and short-haul traffic, the short riders standing at the front, convenient to the door and the long riders selecting seats at the rear. Another arrangement, not so common, has cross seats the full length of the left side and longitudinal seats along the right side. This really offers practically no increase in standing room, while making half the seated passengers needlessly uncomfortable.

The Seats Themselves

Seating in the City type bus should be such as to give the passenger real comfort without luxury. The seats should be tilted backward sufficiently to give the passenger a restful posture and to prevent his sliding forward when the brakes are applied; yet the seat back should not recline. City buses are not intended for long rides. For short ones, an erect posture is preferable. They should have soft enough springs to prevent discomfort from rough roads, yet not so soft as to cause bouncing. Arms on the seats should be avoided as they make it difficult to get in and out of the seats. Foot rests are ordinarily not considered necessary for short rides and they do interfere with the use of the space under the seats for small articles of luggage and parcels.

Upholstery should be sanitary, durable and good-looking. Rattan is used to a greater extent than it deserves, seeing that its stiffness cuts down riding ease, that it soon becomes discolored and unattractive and that its alleged sanitary character is over-rated. It is the custom of some companies in the country to paint rattan cushions with yellow paint when they become discolored. This is especially poor practice, however, since in hot or humid weather particularly, the paint under the overlapping strands will refuse to set and then when these surfaces are exposed by the flexing of the material, a pattern will be impressed upon the passenger's clothing. Rattan is non-absorbent, so that when a mechanic in greasy overalls surrenders his seat to a woman in a silk or flannel skirt, the grease is transferred to its surface.

On the other hand this class of upholstery can be cleaned very easily with a damp cloth and is the most practical sort for buses serving factory districts, where the majority of the passengers are not fastidious. Whipcord or any of the various pile fabrics are unadapted to city bus use both because they are not sufficiently durable and because they are too difficult to keep clean. Dusty, dirty plush is about as unsatisfactory an upholstery as can be found, as witness old-time suburban steam railroads. Genuine leather of good grade is too expensive for this class of service, while the cheaper grades are inferior in every way to the high-grade imitations.

Imitation leather, therefore, is the most satisfactory upholstery for the majority of conditions in which City buses are operated. Its durability is great, it is very flexible, attractive in appearance and is easily cleaned. Only the best grades should be used, however, for some of the lower-priced kinds soon lose their coating of coal-tar composition and the unprotected fabric below quickly becomes ragged. Some have even been found to exude a black substance which stains the clothing. The highest grades of leather fabric, however, are free of these drawbacks and have definitely proven their merit.

Headroom is most important, even though few or no standees are to be expected, in city operation. There is no reason why a six-foot man should not be able to walk to the rear of a motor bus without denting his derby. This means that about 1½ inches should be allowed for the height of the crown above the head, making 73½ inches the proper clear headroom for a City type bus.

Windows

Windows in City buses should be glazed with a good quality of glazing glass and should be set in metal frames. Metal frames do not swell with the dampness nor warp in a drouth. When properly fitted and after passing through the preliminary working-in when the varnish is new, they work more easily than wooden frames and are much less likely to leak rain or cold air or to rattle. They are also lighter and their narrow edges make the appearance more attractive. Contrary to the usual conception, extra-thick glass is not an advantage. Thinner glass is not merely cheaper to replace; it is more flexible and therefore less likely to crack and saves enough weight in an ordinary City bus to equal that of one passenger. The windows should be regulated by stout metal catches—the old strap arrangement is not only *passé,* but has never been a success. For servicing purposes all panes should be of uniform size.

The necessity for emergency doors is more imaginary than real and there are only a few cities in which their use is obligatory. However, since it does not seem possible to do away with them entirely, it is well to make sure that the type used is the best. Two locations are in general use, at the rear of the bus and at the left side. When located in the rear, the emergency door is at the center and continues the aisle through the rear end seat. To avoid loss of the seat which would otherwise be there, the door itself is usually fitted with a back cushion and a removable seat cushion is placed across the door. Unfortunately this loose cushion is apt to be uncomfortable and if the latch is tampered with, may allow the door to fly open, depositing the unfortunate occupying the seat upon the pavement. Having the emergency door in the center, furthermore, makes it impossible to carry the spare tire in the usual position and still permit the door to open. There is no other location for the spare tire on the conventional bus that has been found as practicable and an emergency door which requires the spare tire to be removed before it can be opened might as well not exist.

A better location, therefore, is at the extreme rear of the left side. This location interferes with neither the rear seat nor the spare tire, and furthermore permits the body to be made stiffer. A solid back on the body is most desirable for its stiffening properties. If it must be cut through the center it will no longer serve as a bulkhead and the body will be inadequately braced in a transverse direction. The door at the rear of the left side just balances the main door at the front end of the right side, being the next best thing to a body with no emergency door at all.

The latch which secures the emergency door should be such as to prevent accidental release or mischievous tampering. It will not do to lock the door, for then in a real emergency, its utility would depend upon the ability of the driver to make his way through the crowd from one end of the bus to the other, even granting that he would not have misplaced or lost the key. Accordingly in some buses the latch is inclosed in a box with a glass cover, it being necessary to break the glass to reach the latch handle. This prevents the use of the emergency door for other than genuine emergencies but immediately raises the question, how shall the glass be broken? If a hammer is chained to the box, mischief is invited and it is doubtful, even with the glass broken if the latch can be operated within the box without the passenger who essays the task sustaining some bad cuts.

Accordingly a locking bar which swings down over the door, notched to receive the latch lever and hold it from being moved has been developed as the answer. To open the door it is only necessary to swing the locking bar up, out of the way and then to operate the latch This cannot be done without attracting considerable attention and yet is only a matter of seconds if necessity requires.

Covering of the Floor

Linoleum has no superior for bus floor covering. Plain wood is unsightly and difficult to keep clean. If frequently scrubbed it will become water-soaked to the prejudice of the joints. Sanitation is impracticable with this type of floor. Rugs and carpets are of course out of the question. Rubber and rubber fabric combination material have also been used for floor coverings. In addition to the fact that the initial cost of such covering is very expensive they have not been found to be satisfactory owing to the fact that they are subject to quick deterioration from the oil and gas which are tracked into the vehicle while it is in the garage. Concrete and other composition floorings are excellent for subway, elevated and heavy street cars where weight is a minor item; but are beyond the range of being practical for buses.

But for satisfaction, it is not only necessary that the linoleum used be of good quality; but that it be properly laid. At one time it was thought that cementing it directly to the wooden floor would make it permanent and water-tight; but the unequal expansion and contraction of the material and the wood floor led to unsatisfactory results. Accordingly the best practice today is to separate the linoleum from the floor by layers of canvas and felt. This gives a floor which is yielding to the step, a good insulator of heat and always remains flat and smooth.

The Driver's Seat

In all arrangements of city buses, it is quite necessary that the driver's seat be so placed that he cannot be jostled by the passengers. Some buses are arranged with a guard rail about the driver's seat; but this is hardly necessary if the entrance door is placed slightly back of the front end of the body and if vertical grab stanchions are judiciously placed. When operated at night, city buses must be brightly illuminated within. The reflection of these lights on the windshield and rear view mirror make driving difficult and dangerous unless some provision is made to keep the driver in shadow. In some buses a solid partition with a glass window and a roller curtain is provided. This is a heritage from the trolley car. It spoils the appearance of the bus, increases weight, makes it difficult for the driver to see back into the bus through his mirror and generally introduces an entirely unwelcome set of rattles of its own. All that is needed is a curtain which in the daytime rolls up tightly above his head and which at night snaps to a ring on the back of his seat.

Standardization in the automotive industry has its limitations. Among these is the location of the driver's seat with reference to the steering wheel and pedals. Nowhere is this matter of more importance than on buses since bus drivers operate their vehicles over greater distances, day in and day out, than any others. Accordingly, by all means the position of the seat should be quickly and easily adjustable.

Heating

Heating, ventilation and lighting of motor buses have possibly come in for as much criticism from the public and from operators alike as any of the shortcomings of a comparatively infant industry. Universally, the exhaust is relied upon to heat the bus. Properly handled, the exhaust from the bus engine contains more than enough heat to provide comfort to all of the passengers in the most severe weather. To do so, though, as much of it as possible must be conducted into the bus and as little as possible lost on the way or after its final escape;

ventilation must be thorough and even and the body must be reasonably well insulated. The heater valve, by which the exhaust is diverted from the muffler pipe into the heater pipes, must be of a type that will withstand high temperatures, carbon and soot, vibration and constant use. It must be responsive and sensitive to the control and so designed that it does not offer appreciable back-pressure to the engine.

Connections from the heater valve should be as direct as possible, keeping the length of piping under the floor down to a minimum, thereby avoiding undue loss of heat at the start. The piping throughout should be of ample size. Small pipe results in back-pressure, which reduces power and reacts unfavorably on the engine valves, and allows but little heat to be released into the body, carrying most of it out the tail-pipe. By far the best results are secured from steel tubing, rather than iron pipe. Tubing is more flexible and therefore sustains vibration for a longer period, it is smoother inside and therefore offers less resistance to gas flow and less lodgment to soot. Finally, owing to its thinness, it radiates the heat much more quickly and thoroughly. Properly applied, the piping at no point should have bends of more than 45 degrees or curves sharper than a radius equal to twice the diameter.

The heater pipes should run in straight lines, along the sides, and should be effectively protected by perforated guards to prevent the possibility of burning passengers' clothing, shoes or baggage.

Ventilation

Proper ventilation was mentioned as one of the requirements of proper heating. This is true because without it, there will be a tendency for the hot air to bank up in certain portions of the body while cold drafts infest others. Even and uniform ventilation insures even distribution of heat by effecting even circulation of air. The object of ventilation, of course, is to provide an inflow of fresh air and a scavenging of polluted air. Fresh air is always colder than foul air, due to the fact that the human breath is warmer at all times than the atmosphere, hence fresh air will naturally descend if not prevented from so doing and foul air will rise, if allowed to. Naturally, then, means should be provided of taking the vitiated air out at the top of the body, relying on the cooler fresh air, entering at the front of the body to travel along the floor to take its place. This fresh air should be admitted in sufficient quantity to displace all of the air exhausted by the roof ventilators and its admission should be so controlled that most of it will enter at the front. This is for two reasons. In the first place, due to the heat of the engine, the front of every bus is apt to be the warmest part, so that the fresh air is tempered and prevented from producing cold drafts. The other reason is that unless it enters at a sufficient rate to balance the outflow of foul air, a slight decrease of pressure within the body will result which will cause cold air to enter through the cracks of the windows, around the doors, etc.

Naturally ventilation is principally a cold-weather problem, since in warm weather the open windows afford more than enough fresh air. However, even in warm weather, a rainstorm may give rise to a ventilation problem due to the necessity of closing the windows to keep the passengers dry. The ventilation problem, indeed, is particularly acute in rainy summer weather since the odor of damp clothing and perspiring humanity at such times combine to exaggerate any unsavory condition of air.

Illumination

Lighting of an adequate sort has only recently come to be recognized as absolutely necessary by the majority of operators. Experience has shown that brightly-lighted buses increase patronage in the same way as brilliantly-illuminated stores and theaters attract crowds. Given a choice the passenger will almost invariably choose the most brightly-lighted store, theater or conveyance, other attractions being anywhere near equal. It has taken the industry some time to provide electric equipment which had the requisite power while being at the same time thoroughly reliable, economical and practical. Systems of this sort are being supplied by a few builders today, however, and there is no reason why any line starting out today should not have its buses as brilliantly lighted as any street car or railway train.

For short-haul, frequent-stop service a means for the passenger to signal the driver is indispensable. The electric buzzer is practically universal and deservedly so, since the buzzer never fails to attract the attention of the driver, yet is free of the grating effect on passengers' nerves of jangling, trilling or clanging bells. Push-buttons should be convenient to all seats, of substantial type and placed sufficiently high to be proof against accidental ringing by passengers' elbows or the mischievous toying of children.

The Sedan Type Body

A great deal of what has been said in general about the City bus applies in more or less degree to the Sedan or DeLuxe type. In certain features, however, the Sedan bus should differ very extensively from the City type. These departures arise from the somewhat radical differences in their spheres of activity.

The Sedan bus is generally employed on routes of considerable length on which there are decided intervals between stops. They operate for higher fares and at higher speeds. Since the passengers ride greater distances, they must be seated more luxuriously to avoid fatigue and since they are more apt to carry baggage, special provision must be made to accommodate it. On such long runs, smokers abstain from the weed only with difficulty and so provision must be made, just as on railway trains whereby they may indulge in smoking without annoying non-devotees. These requirements have brought into being a type of body which is in reality a multiple limousine, in which seats of the sort found in private motor cars are arranged to form a series of transverse compartments, sometimes intercommunicating within and sometimes independently reached by individual outside doors. In such bodies anything even faintly suggestive of street car or railway appearance should be avoided, the general character and appearance throughout being characteristic of the most luxurious private closed automobiles.

Seating Arrangements

In bodies of this description, there are four principal types for interurban transit service. One of these is of the unit compartment type, in which, save for the smoking compartment over the rear axle, each seat constitutes a separate compartment with an individual door. Another has three compartments, the smoking and baggage compartments at the rear, as with the first type, and a single front compartment, reached through one door, with an aisle along the side by which all of the seats in that compartment may be reached. These types are for long routes primarily, where stops are made at long intervals, such stops being at regular stations or terminals at which the driver alights, assisting passengers in getting out and with their baggage.

The third type is the pay-enter type of sedan, sometimes known as a saloon or Pullman body. In this type there is a single passenger door at the front, like the City type, with an aisle down the center. The seats are no less luxurious than in the other types; but there is somewhat less privacy. This type is designed for use on long-distance routes on which the stops are more frequent, as in suburban service, where the driver cannot be expected to get out of his seat at every stop or to walk along the side of the bus, collecting fares. The baggage is sometimes carried at the front of such bodies, alongside the driver. This type, however, is coming into some favor for the same service as the first two types, since it permits the passengers to move about, passing to and from the smoking compartment, if desired, at will. Thus in a mixed party, the gentlemen may leave the party for a short smoke without having to wait perhaps an hour or more for the next stop before rejoining it.

The Doors

As mentioned above, the arrangement of the seats determines both the type and the number and location of doors. Doors are usually of the same type as used on closed passenger cars except, of course, that they are much heavier and usually somewhat wider. As a rule they hinge from the front, so that should the bus start with a door open, its own inertia and the force of the wind would close it. In this service, standing room is not provided and so the headroom is somewhat less than standing height. This is desirable for the sake of appearance and also for clearance under trees. In lieu of the emergency door, there is usually one door next to the driver on the left side and sometimes another on the left side at the rear.

The fourth type, usually known as the Parlor Car or Club type is also of the single-door pay-enter type, but instead of having fixed seats, is equipped with individual, movable chairs. This is a super-DeLuxe type for private tours, transit to exclusive suburbs, clubs and resorts.

Baggage Space

Two forms of driver's seats are used on DeLuxe buses. The individual seat is used generally on the pay-enter types, including the Club type, while the unit compartment type ordinarily has a full-width front seat which the driver may share with two passengers. Sometimes in bodies of this type, the forward compartment has only the driver's seat, the rest of the space being used for baggage, as in a taxicab. The front window in such cases is usually barred to avoid the possibility of golf bags or satchels piled high breaking the glass. This arrangement for baggage is open to objection on the score that it eliminates the most desirable seats in the bus, makes it difficult for the driver to reach the passengers at the right of the bus, cuts down the vision of passengers in the next compartment and is decidedly unsightly.

A better scheme is to use the extreme rear compartment of the bus for baggage, separated by a partition with a window from the smoking compartment and reached by a separate door at the extreme rear of the right side. On pay-enter buses a baggage basket may be built just in front of the door, on the right side, convenient to passengers entering or leaving, constantly under the driver's eye and large enough so that high piling is unnecessary, so that vision is not impeded. In club or parlor car types there are usually baskets over the wheel houses which are available for small pieces of luggage.

Of course there are other schemes for baggage carrying. The old English coach idea of railing in a space on the roof has been used to a considerable extent. A ladder of some sort is used by the driver to climb up to the roof with the baggage and a tarpaulin is stretched over the load when in place. This scheme necessarily consumes time. There is the danger of loss of baggage and damage from overhanging trees and rain or snow and a certainty of the collection of much dust and dirt. Another method of carrying baggage is in a box at the rear of the bus. Such a box is usually an afterthought perched precariously at the back of the bus where it is not only most unsightly, but exposed to constant danger of injury from side-swiping other vehicles in making turns. They are very rarely dust or waterproof and due to their restricted capacity and darkness they render the selection of a particular article of luggage difficult. In some of the newer bodies boxes of this sort have been built into the body. The improvement in weather-tightness has been considerable; but in a great many cases their appearance is even worse and they are equally cramped and dark.

Seating

There is little that need be said regarding the seating save that it must provide the utmost in luxurious ease, else rides of great duration become intolerable. Springs should be deep and soft, yet not so lively that the passenger is kept in a state of constant jiggling motion. Various arrangements of compound springs are of assistance in breaking up the recoil of cushion springs. Another thing which is effective is the modified bellows type cushion in which the cushion and springs are completely inclosed, save for a small opening in the bottom. Under severe jolting, the restricted outlet for the air imprisoned in the covering checks the rather too sudden deflection of the springs, while the vacuum formed on the rebound, effectively slows this up also. The result is an easy floating action rather than the violent bouncing which is to be expected of unrestricted springs of great liveliness.

Various other types of seat suspension are being developed, some of which show great promise and are well worth the consideration of operators catering to long-distance traffic.

Upholstery

Whatever the form of seat, upholstery is of great importance. For all-round serviceability, nothing equals genuine leather; though it is sometimes objected to on the grounds of its being hot in summer. Slip covers of stout ticking or other cotton or linen fabric can be used in hot weather, however, such slip-covers being readily washable and adding tone to the bus. Plush, velours, whipcord and mohair are also used to some extent for DeLuxe bus upholstery. These are excellent in cold weather if kept scrupulously clean; but should be covered with slips in hot weather. Imitation leather is useful for inside lining of the sides and roof and for the back sides of seats; but should not be used for the cushions. This is not entirely because of any fault with the imitation leather; but because after some use, its non-genuineness is surely betrayed and anything but the highest class materials of upholstery is out of keeping with the DeLuxe spirit of Sedan equipment.

Window Hanging

Frameless windows of somewhat thicker glass than used on City type buses have been found most satisfactory on DeLuxe bodies. There are various types of regulators for such windows, including the crank type in all its variations and the Clement type. The latter is much simpler than the crank type, with practically nothing to get out of order and when used on each side of the window works perfectly.

Linoleum forms a very satisfactory floor covering for most buses. In super-DeLuxe types, though, it is sometimes desirable to have a carpet of some sort, such as the people are accustomed to finding in private closed cars. Such carpets can be cut to fit the spaces around the seats, etc., and to fasten with curtain fasteners or snaps. They will thus be easily detachable for cleaning and for scrubbing the linoleum beneath.

A FINAL WORD

Bus operation is a business. It is the business of rendering and selling a service of transportation. As a business venture, it must be profitable to be successful. Profits are just one thing—the difference between revenue received and the cost incurred. How well a bus fulfills this purpose determines its value. In the final analysis that bus is best which produces for its owner the greatest amount of net profit.

Profit demands performance, comfort, appearance and economy. All are important. Performance, comfort and appearance largely determine the possible revenue. The profit demands how economically these things may be rendered to the bus rider.

Superlative performance, luxurious comfort and splendid appearance, handicapped by excessive operating cost, whether because of poor management, unskillful operation or unreliable and uneconomical equipment will show red figures on the ledger.

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